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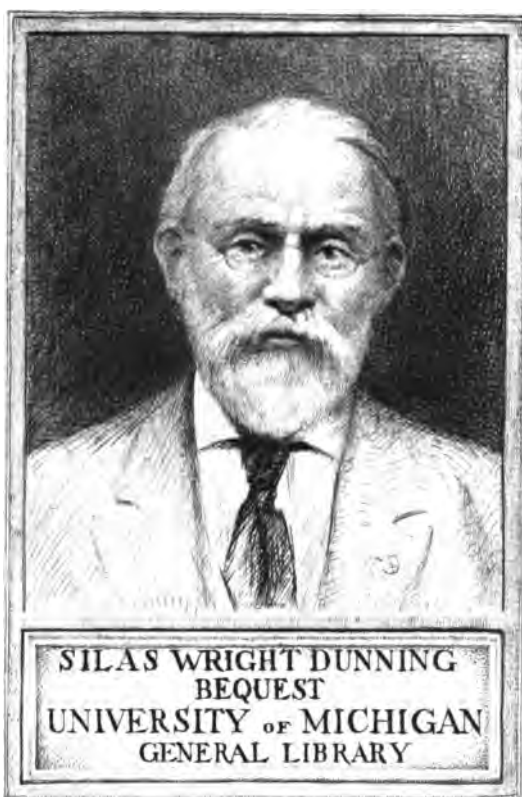
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CAVALRY FORMATIONS,
By **MAJOR P. NEVILLE**, 14th Bengal Lancers.

Echelon v. Line for Attack.

The importance to the cavalry leader of securing and retaining the power to manœuvre up to the last safe moment is incontestable.

There is an epoch in every cavalry fight when further manœuvring becomes dangerous, and when the attack must be delivered straight home if it would succeed: the side to which this crisis occurs last has a great advantage. While the enemy, in the former case, must ride straight to his front, the general who retains the power of manœuvre longer can work into position to strike at his flanks. How such power is to be secured becomes an interesting problem for cavalry soldiers of every rank.

The general rule laid down in drill books, that the first line should manœuvre to gain the enemy's flank, is sound theoretically, but when it comes to the actual fight, it is very rarely (except when the engaging bodies are insignificant) seen in practice.

In our camps of exercise it may be observed, that when the hostile divisions come within sight of one another, they bear straight down to their front, form line, and charge. There is little or no manœuvring; nothing but a straight end-on attack. The reason for this seems to me to be the unwieldy nature of the frame work of the attack formation as we at present understand it.

There is the first line, which it is considered necessary to make as strong as possible, occupying an extended front in squadron column at deploying intervals. Then there is the second line in support on one flank, the third line in reserve on the other, and the horse artillery battery or batteries.

To make even a very small change of front, retaining this formation, requires time, and in the cavalry fight there is very little time available for anything. The commander who, when the hostile division is in full view, successfully manœuvres so as to gain its flank, must have an exceptionally good head on his shoulders.

He has a host of things to think of. First, he must very quickly decide where he will post his guns, or these will not have time to get well to the front, which (under conventional conditions) they should do, so as to avoid being masked by the advancing cavalry. Then, having decided on this and given orders to the guns, he has to send his gallopers to the second and third lines to warn them of his intentions. All this time he is advancing; so is the enemy. He cannot see clearly what formation they are in,—a cloud of dust from which flashes of arms appear is perhaps all he sees. He remembers that he ought to be manœuvring towards the flank farther from the guns. His gallopers have not returned; he fears the brigadiers of his second and third lines will not understand. He takes ground to the outward flank for a short distance, and there seeing, as he thinks, the enemy forming line, he resumes his original front, forms line, and orders the attack to the front.

If there is difficulty in thus manœuvring in sham fights, how much more in a real one, in which artillery fire becomes a factor, unsteady men and horses, and perhaps knocking over gallopers and trumpeters, without whom the leader is very helpless.

But this power of manœuvring up to the very last safe moment is the great *desideratum*, for it is certain that the flanks are the weak points of an attack, and a blow delivered there is victory half gained. This brings us to the consideration of a different formation for attack.

Before entering on the subject of Echelon *v.* Line, it may be well to repeat some simple axioms concerning the employment of cavalry generally: these are:—

1. The enemy should, whenever it is possible, be attacked in flank or rear, as these are his most vulnerable points.
2. A small body, as for example a squadron, may continue to manœuvre to within a very short distance of the enemy before forming line for attack; but as the attacking line increases in strength, so does the time admissible for manœuvre diminish in direct proportion.
3. The longer the charging line, the greater will be the confusion after the collision, and the more time required to re-form and resume the offensive.
4. The side which brings up the latest formed bodies will generally secure the victory.
5. At the actual moment of collision preponderance in strength gives no advantage to the side possessing it.

This last may seem paradoxical, but is not so on consideration. What it means is, that in a charge a body is only opposed by its own number. For example, if 50 men (in front rank) charge 100, at the instant of the shock they will be opposed only by the 50 men actually in front of them, and, if better mounted and in closer formation, they will ride those 50 down. Now suppose that the remaining 50 files of the stronger line, passing by at a charging pace, open out and get into disorder, and that they are then in their turned charged by a body of the same strength coming up at a collected pace and in good order; it is more than probable that these latter will be victorious.

This is the starting point of the echelon attack.

The squadron is the tactical unit of cavalry. It is as much as one man can efficiently handle in a fight. Once the actual combat engaged, regimental, line, brigade commanders cease to have any further power over their commands. It is the squadron leader then, whose intelligent appreciation of facts, whose readiness of resource, promptness of action, energy, pluck, dash, and *savoir faire* win the day.

General Carl von Schmidt in his book on cavalry leading says (p. 125):—

“The good order and cohesion of troops in large masses depend principally on the independence and correct movement of squadrons. However necessary divisional drill may be to prepare cavalry for actual warfare, * * * still it would be far better to forego these drills if they conduced to the impairment of good order, cohesion, and certainty of movement. * * * The point is, and it cannot be too often repeated, the *thorough independence of the squadron as the tactical unit, uninfluenced by any aberrations of the neighbouring squadrons*, and always completely in the hands of its leader”.

Again he says (p. 127), “An inviolable principle for the handling of large masses is, that *the squadron must in every respect be considered the tactical unit*; and this fundamental principle must on no account be infringed.”

Now, having realized this important point, that the squadron is the tactical unit, and that its complete independence is a *sine quâ non* of successful action in the field, let us consider the conditions under which two equal forces would contend when attacking, one side in line and the other in echelon.

The presence of second or third lines is expressly eliminated from this consideration.

Let A (see Figure 1) be a line of 8 squadrons, attacking in line, and B a force of equal strength in echelon from the right, and let the squadrons be of equal strength *i.e.* 48 files. Suppose the word “charge!” to be given simultaneously to line A and No. 1 squadron B when they are 120 yards apart, then this is what will occur. Squadron 8 A will meet 1 B with equal chances of success, but not so the remaining squadrons; for while each of those in the echelon gallops up at a collected steady pace and charges for 60 yards *only*, those of force A will fare as follows—

No. 7 A	will have to charge for 120 yards,
“ 6 “ “ “	180 “
“ 5 “ “ “	240 “
“ 4 “ “ “	300 “
“ 3 “ “ “	360 “
“ 2 “ “ “	420 “
“ 1 “ “ “	480 “

before their respective collisions take place. This means a steady diminution in the chances of success to A's squadrons from 8 to 1; for not only will the horses be more and more blown and distressed (especially if the ground be heavy) as each collision occurs, but, and this is the greater evil, confusion and disorder will inevitably take place,

increasing in proportion to the distance to be covered, until it may be fairly assumed that the last three squadrons will be, when charged, a mere rabble without order or cohesion.

All cavalry men know the difficulty, even on the parade ground, of keeping an unbroken line at charging pace for more than a fraction of time, and the longer the line, the greater the rout. Charging is like stampeding: horses get excited, and often quite unmanageable, and once the line committed to the "charge," it is hopeless trying to check them for any purposes of manœuvre. Otherwise it might be argued that A's commander seeing B's formation, would check the pace of his unengaged portion and form also an echelon on the move.

This however is impossible. In the line attack the "thorough independence of the squadron as a tactical unit," so strongly insisted on by von Schmidt, is sacrificed. The squadrons, be they 4, 8, or 12, obey the command of but one man: squadron leaders have nothing to do but ride straight and set the example of fearlessness.

Examining the foregoing example we find the following points for consideration,—

Against the line.

1. The line attack, even when in squadron columns, has very little manœuvring abilities. Changes of front are slow and must be effected at a distance.
2. The longer the line, the more ground covered in getting on a charging pace. With large bodies the pace must be very gradually increased or confusion will occur.
3. Once committed, there is no disengaging any portion of the line.
4. The independence of the squadron as a tactical unit is sacrificed.
5. Once line is formed, all manœuvring is over.
6. The chances of success decrease in proportion to the ground that must be covered at charging pace before the collision.
7. Time, that most important factor, is wasted in reforming, men of different squadrons getting mixed up &c.
8. When reformed, the line is a cumbersome machine. The squadrons, having lost their independence must await specific instructions before taking any initiative.

In favour of echelon.

- (a.) Greater power of manœuvring, the squadrons being independent. After A had formed line, B had still time to wheel his squadrons half right and out-flank A's left by several squadrons. These squadrons, owing to their independence, could then wheel round on A's rear.
- (b.) Freedom of movement. Not being jammed in line each squadron has ample room to manœuvre.
- (c.) Power of commander to disengage. As the squadrons are successively engaged, the commander may, if he see fit, even after the leading squadrons are in collision, disengage one or more squadrons from the rear of his echelon, and may

either hold them back in reserve, or may direct a flank movement either for attack or defence.

- (d.) The squadrons being independent, can come up at a collected gallop, and are not obliged to charge for more than 50 or 60 yards, thereby securing the best chance of success.
- (e.) Manœuvring power is retained up to the very last moment, even after the head of the echelon is in collision.
- (f.) This formation fulfils the condition of bringing up successive fresh bodies of troops.
- (g.) The squadrons being separate can very quickly rally and resume the offensive independently, affording mutual support to one another.

Against the echelon form of attack in the example given, may be urged—

1. *That the head of an echelon is its weak point.* Here the chances of the contending forces are even, and if B's 1st squadron were defeated and driven back, the victorious enemy might wheel round and ride along the rear of the echelon taking each squadron on its exposed flank. If A's line has two exposed flanks, B's echelon has 8.

This is very true, and it would therefore be necessary to protect the head of an attacking echelon by a squadron refused on the weak flank as shown in figure 2.

This ought to be amply sufficient to prevent any such catastrophe, as it has been shown that each succeeding squadron has increased chances of success.

2. *There are numerous gaps in an echelon, through which an enemy might penetrate.*

In reply to this, it will be evident that if the line rides straight to its front, as a line ought to ride, it will have less chance of breaking through an echelon than through another line, for each squadron of the echelon attack should be taught to cover the inner flank of the squadron ahead, so that this formation should present none of the intervals between squadrons which are the weak points of the line.

There will be found in every squadron in every country one or two cowards who have no stomach for fighting. These may, it is true, by riding obliquely, endeavour to avoid the combat by sneaking between the rungs of the ladder; but supposing they did penetrate, would such men be formidable?

They would certainly, by so doing cause opening out and disorder in their own ranks. If, however, some fighting men were to break through, they should be dealt with by small bodies (divisions) riding in rear of the echelon, after the manner of "succour squadrons."

These might be supplied by the second line.

3. It may be said—"A, seeing B's formation and imagining his left flank to be threatened, might change front half left before committing his line to the attack."

For example, supposing B to be advancing against A as in fig. (3).

He determines to strike at A's right flank. During his advance (fig. 4) he takes ground to his left by the half column, until his centre is somewhere opposite to No. 3 of A's line. This leaves No 8 B free, which squadron galloping to the front, attacks the flank of A's line.

Supposing No. 1 A to be routed by this attack, it will be evident that No. 7 B is free and may be moved over to the right flank of the echelon, which in squadrons was originally numerically weaker than A ; or it may be retained in rear as a support, or again it may follow No. 8 and attack the rear of A's line.

This affords an example of what is meant by an echelon's power to manœuvre up to the last moment. The double echelon may, during its advance, be converted into a single echelon from either flank.

Suppose, for example, B's force advancing as in fig. (3).

It is desired to attack in echelon (*a*) from the left (*i. e.* strike at A's right).

B takes ground to his left by the half column until his No. 5 is opposite A's right. He retains No. 6 as support, and moves Nos. 7 and 8 over to his right to prolong the echelon on that flank.

The double echelon is in itself a stronger and less vulnerable formation for attack than the single echelon. The latter is weak to resist any attack on the prolongation of a line drawn thro' the centres of squadrons. Should such a case occur—unlikely—given a skilful general, the echelon should wheel into column to meet the attack, forming double echelon from this formation as may be ordered—so many squadrons being ordered to the right (or left).

There is also another point in its favour which deserves notice. Supposing the collision to have taken place (fig. 3), and each squadron to be engaged in a hand-to-hand *mêlée* with one of equal strength. We have already seen that owing to his superior formation B has an advantage over A. After a short struggle therefore, it may be assumed that A's squadrons would begin to give way and retire. At such a moment, consider what effective damage might be done by formed bodies coming up on the flanks of B's echelon and charging the retreating enemy in his disorderly retreat (fig. 6).

The third form of echelon (the inverted double) consists of a single echelon (*a*) directed against either flank of the enemy's line. Figure (7) gives an illustration of this.

The two wings of B's force manœuvre outwards and attack both flanks of A's line. This leaves a gap in the centre which must be filled by squadrons from the second line. This is a difficult attack to meet. At first it is not clearly apparent to A what B's formation is. He suddenly finds both flanks threatened. He most probably will wheel his regiments outwards to meet the dual assault, and then down on his exposed flanks come the "stop-gap" squadrons of the 2nd line.

This formation would not be used except in a case where the enemy was considerably inferior in numbers.

In manœuvring power echelon (*c*) is inferior to (*a*) and (*b*).

Of the three forms of echelon it appears that the first (*a*) gives the greatest tactical advantage, as each successive squadron from the head

of the echelon has increased chances of success, as has been shown. The second (*b*) has the greatest manœuvring power. It may attack the centre or either flank of the hostile line, and may be converted on the move into a single echelon.

The third form is the most difficult for a line to meet, but it requires superiority in numbers, and has other drawbacks which render it an unsuitable form of attack except under abnormal conditions, which it will not profit to discuss.

Once troops are practised in making echelon attacks, it will be soon understood by squadron leaders that at any moment of an engagement they may be called upon by the line commander to act independently, and moreover, that very frequently opportunities will occur (the phases of the battle-field are infinite in their variety) demanding from them immediate and vigorous action on their own responsibility, for example, when the flank squadrons see a chance of falling in the flanks or rear of the enemy's line. The object of the attack is to break and defeat the enemy's power. To this end each squadron, as a unit of the whole, must contribute to its utmost mutual support and assistance. Up to the moment of the "charge" the squadron commander must look most attentively to the line leader, as he is liable to be disengaged and sent to either flank, or held back in reserve; but once the "charge" ordered, he is his own master. In the *mêlée*, rally, and subsequent action, he must on his own responsibility by all means drive the enemy back from his immediate front, and assist in every way the neighbouring squadrons, should they be hard pressed. Two things he must religiously avoid—retreating, and pursuing, unless forced or ordered.

When this is clearly understood and practised, the line commander will find that instead of a rigid and cumbrous quarter-staff, he has to his hand a supple and flexible foil. He can now manœuvre freely, even during the actual combat, taking advantage of every opening and every mistake made by the enemy.

He is not obliged (as in the line attack) to engage the whole of his force at once or in the same direction, but can, by a signal—a wave of his sword &c., indicate to individual squadrons the nature of the duty required of them, trusting to the intelligence and zeal of his squadron leaders to perform it to their utmost ability.

As an instance of the freedom from conventional trammels which the system of the "squadron unit," affords, take the following—(fig. 9).

Here two forces of equal strength advance to the attack, one in open and the other in close formation. Commander B, deciding to strike at A's left flank, sends out a column of divisions half right. Seeing A changing front half left to meet this, B despatches his two left squadrons (7 and 8) against A's right, and attacks with his remaining six squadrons in echelon from the right.

Of the echelon attack as applied to the cavalry division.

I began this paper by propounding the problem how a cavalry leader may best secure the power of manœuvring up to a later moment than his adversary, and I think I have shown, while only briefly touching

on the subject, that an echelon form of attack gives this power over a line and also other tactical advantages.

Hitherto, we have only considered examples concerning single lines. It is true that the second line was mentioned in connection with the inverted double echelon, but it was not intended to do more than make a passing allusion to this formation, omitting to regard the action of supports and reserves, and making no mention of that very important factor, artillery fire. Now let us see how the foregoing principles may be applied to the conduct of the cavalry division during a combat.

It must be understood clearly that nothing in this paper refers to Cavalry v. Infantry. The mode of conducting such a fight is entirely different.

Plate 10 is an illustration of the conventional attack of the cavalry division.

A division of three brigades (each of two regiments) with a battery of horse artillery is first seen, advancing in close formation. On the whereabouts of the enemy being discovered, the first line opens out to deploying intervals between squadrons. The enemy being sighted, the guns come into action, while the first line manœuvres to gain the opposite (*i. e.* from the guns) flank of the enemy. When manœuvring is no longer admissible, the division forms for attack; the first line, strengthened by two squadrons from the support, in line; the support in line of squadron columns (sometimes in echelon of wings); and the reserve, which supplies two "succour squadrons" in regiments (close order) at deploying interval.

Theoretically (given that line is the only formation for attack) this is sound; *but*, it pre-supposes that the enemy will do nothing but blunder on helplessly to his original front, or else will change front to to meet this flank attack which would expose him to enfilade fire from the guns. Is it likely, however, that an intelligent enemy would do either of these two things? I think not.

It is far more probable that he would do just as we do, that is, he would plant his guns opposite ours, and himself manœuvre so as to meet us, whereby (Plate 11) neither side would gain any tactical advantage, unless it were owing to the conformation of the ground or some unforeseen contingency.

Again, suppose two opposing divisions, one of which (blue) manœuvres in this conventional manner, while the other (red) adopts an echelon formation. Let them be equal forces in every respect, and let us disregard all questions of topography. An open piece of country has been selected, with ground giving equal command to red and blue guns.

As no fire action is under consideration (except that of the artillery), the villages and enclosures may be disregarded.

The village of St. Sorlin does not defile the troops beyond it from the fire of the red guns.

Both divisions are advancing by opposite routes (Plate 12.) on the village of Bussy-le-Moine. They are in preparatory formation, as shown by the dotted lines (black), and about $2\frac{1}{2}$ miles apart.

At 10 A. M. the blue commander places his guns on the heights N. E. of Bussy with one squadron from his 3rd brigade as escort, and at the same time orders the division to take ground to the west in the usual conventional manner. The blue division reaches the position shown in outline (black) at 10.8 P. M. The red commander, observing this movement from the heights S. of Bussy, orders his guns to move up to the position shown, W. of the village, escorted by a squadron from the second brigade.

He orders his third, followed by the first brigade, to take ground to the left in a N. W. direction, both brigades in column of divisions.

No. 2 brigade to form the reserve, and take up a position out-flanking the guns S. of St. Sorlin.

The commander accompanies the third brigade.

When a point is reached in the line of fire of the enemy's battery, he orders a change of direction half right, and his division is in the positions shown in outline (black) by 10h. 8m.

The blue guns open fire at 10.3½.

The red guns at 10.5 A. M.

Remarks.

1st Phase.—The blue commander, seeing from the heights the red division about 3,500 yards distant, and noticing the open ground to his W. decides very properly to place his guns on this spot and manœuvre against the enemy's left flank. His guns, it will be seen, move up at a gallop 850 yards, and come into action on the crest of the heights, while the cavalry move to the W. as ordered, the second brigade being in column of divisions, the other two in close formation.

The red general observing this movement and rightly divining the intentions of his adversary, instead of sending his guns straight to the front down the Bussy road, moves them some 750 yards to the left, i. e. towards the direction in which the enemy are moving. This, as will be seen hereafter, is a great advantage.

He sees that the blue guns have come into action about 2,500 yards from his position (on the Bussy road); he therefore orders his first and second lines (3rd and 1st brigades) to take ground to their left. The result of this manœuvre is that his first and second lines are never during the action within 3,800 yards' range of the blue guns. The reserve (2nd brigade) takes up a position within 3,300 yards' range, as we shall presently see, and forms line so as to present the most difficult target to the enemy's fire.

The hostile batteries are 2,700 yards apart, and during this phase engage one another, but the red guns fire several rounds to unsteady the enemy's cavalry at 2,200 yards' range.

The blue guns have the advantage of being in position first and being able to fire several rounds at the red battery as it is coming into action, which, if the distance is correctly judged, should unsteady and perhaps damage the latter.

2nd Phase.—The blue leader, seeing he is gaining nothing by his flank movement, and fearing to get too far from his line of retreat, changes direction half left and forms fighting disposition.

His first line in squadron columns, prolonged on the right flank by two squadrons of the first brigade (second line). The third brigade forms the reserve on the left flank and sends two squadrons in direct support to the first line.

The leading squadrons check their pace to allow this movement to be carried out at a trot, and the blue division is in the position shown (black filled in) by 10-11½.

The red commander takes no notice of this movements, but continues his diagonal advance with his third and first brigades. The second brigade takes up the position shown (black filled-in), and halts in line.

The red guns are directed on the blue cavalry, which is now exposed to a partial enfilade at about 1,500 yards.

Remarks.

The action of the blue commander is sound throughout. It would be folly to prolong the flank movement beyond this point (see plate 11). His dispositions for attack are perfectly in accordance with conventional rule.

The red commander keeps straight on. His object is to force his adversary to make a change of front which will expose him to an effective enfilade fire from the red guns. At 10-12 A. M. the blue first line is exposed to a partial enfilade, the nearest point being about 1,500 yards range. This fire would have an unsteady effect on men and horses and if well delivered should cause some damage to the blues.

It will be seen by "line of defilade No. 1" that up to this, the whole of the red cavalry is exposed to the fire of the blue artillery, but at a long range and in a formation that requires great nicety of judging distance to produce any result. Their distant brigades may be considered as practically untouched by fire.

3rd Phase.—The blue commander is obliged to change front, about ¼ right (dotted blue), 10-14.

The red column keeps straight on. All the red guns fire on blue cavalry.

Remarks.

This movement, which was unavoidable for the blue, is disastrous, as it exposes the first line to the enfilade fire of the reds at 1,200 yards' range, and their reserve brigade is now but 1,000 yards from the red guns.

The red artillery will of course take advantage of this opportunity to pour the hottest fire possible on the blue first line. This should, at the comparatively short range of 1,200 yards, be very effective, causing numerous casualties.

The leading red brigade and a great portion of the following one, are now safe from the fire of the blue guns, see line of defilade No. 2, which can only fire at the red guns and reserve brigade, while the whole of the blue cavalry is exposed to the effective fire of the red guns.

4th Phase.—The blues, finding themselves galled by a flank fire, form line and push on to the position shown (outline blue).

The reserve brigade (5 squadrons) forms line of squadron columns, and being now but 800 yards from the red reserve, brings up its right shoulder and advances to the attack (outline blue).

The red leading brigade wheels into line to the right, and advances in double echelon from the left of the first regiment, the fourth squadron of the second regiment forming a support in rear (black filled-in).

The first brigade, following, dis-engages to the left and passes in rear of the double echelon.

The red guns concentrate fire on the blue reserve at 700 yards range, 10-15 $\frac{1}{4}$ A. M.

Remarks.

At the close of this phase, the blue commander is quite in the dark as to the intentions of the enemy. He sees the leading brigade advancing in a double echelon against his centre, and the second line passing in rear of the echelon, while the village of St. Sorlin on his left prevents his having a correct idea of the position or numbers of the red reserve. However, having formed line (when, as we have seen, all further manœuvring power ceases), there is nothing left for him but to push on straight to his front. His second line is formed in echelon of wings about 160 yards to his right rear.

The red commander now begins to enjoy the advantages of superior manœuvring power. While the blues must come on straight in line, he can now attack their centre or either flank at pleasure. He quickly decides to attack their left, and directs his No. 8 squadron to prolong the echelon on the left followed by his Nos. 1 and 2. At the same time he sends word to his second line commander to move round his left flank and engage the blue second line.

The red guns concentrating their fire on the blue reserve at 700 yards should cause great damage. It will be observed that by this time, 10-15 $\frac{1}{4}$, almost the whole of the red cavalry is screened from the fire of the blue guns, only the first regiment of the reserve being exposed, while the blue cavalry, especially the reserve, is exposed to a deadly flank fire.

5th Phase.—The blue line pushes on, crossing the high road which causes some confusion, the second line following in the same formation; the reserve further bringing up the right shoulder form line, and increases the pace to escape the now fatal fire of the red guns which must be passed within 500 yards.

The red echelon takes ground half right during its advance, the squadrons ordered prolonging on the left.

The red reserve is now directed to send a squadron at the left flank of the blue line.

The red first line commander, seeing this, sends his No. 3 to prolong on the left, and advances to the attack in single echelon from the right.

The red second line leader sends a squadron in direct support of the echelon, and passing along the rear, wheels the head of his column to the right, and is in position to prolong the echelon on the left.

The red reserve commander sends a squadron towards the guns in case they should be attacked, and advances in echelon (protected) from his left.

The escort to the artillery, seeing no attack on the guns is meant, moves round to the left rear, and gets in position to fall on the left flank of the blue reserve, 10-16 A. M.

Remarks.

This brings the fight up to the moment before the collision. It will be seen, that owing to the position taken up by the red reserve, the blue reserve, now but five squadrons strong, is obliged to move off to its left, away from its first line, and attack a superior force of seven squadrons under a heavy artillery fire at a very short range. The blue first line is threatened on its left flank by No. 8 squadron second brigade red. (This squadron, however, seeing the favourable disposition of the echelon, does not attack the flank of the line, but passing in rear, charges the succour squadrons in flank and is attacked by the red echelon of eight squadrons with one in support). Here the echelon gives all the advantages previously enumerated, so that, adding to the disadvantages of the blue first line the casualties caused by the heavy enfilade fire they have been exposed to during this advance, we may, I think, fairly estimate the ten blue squadrons in the first line, to be no more than equal to the eight fresh squadrons untouched by fire, of the echelon.

This leaves in the second line seven red squadrons opposed to six blue.

The whole of the red cavalry is now screened from artillery fire, while the whole of the blue is exposed at ranges from 500 to 2000 yards.

The red echelon during this phase had for object to gain sufficient ground to its right to enable the leading squadron to out-flank the enemy's line, while at the same time squadrons 8, 1, 2, and 3 moved across to the left and took up their positions in prolongation of the echelon. This they were able here to accomplish by a half column movement, but if there had not been time for this before the collision, then they could have taken ground to the right.

The Collision.

A glance at Plate 13 will show that the blue reserve has fared badly. Having to incline to its left to clear the village, it comes under case fire of the red guns at 350 yards range, and is charged in flank.

The red commander, seeing his superiority at this point, sends No. 7 squadron to the assistance of No. 8.

This last, passing in rear of the blue line, charges the succour squadron nearest to itself in flank before it can change front, and presumably disperses it, but is in its turn attacked and defeated by the other blue succour squadron. No. 7 second brigade red now coming up, attacks and routs this last blue squadron, proving the truth of the axiom about bringing up the last formed body, and leaving the red with one squadron to the good, which wheeling round, now attacks the rear of the blues, 10-21 A. M.

The red succour squadron (No. 1 1st brigade), seeing that the echelon has not given way at any point, now sends a division to the assistance of each of the four rear squadrons of the echelon (i. e. No. 2 regiment, 3rd brigade). This clears the enemy from the front of these squadrons, which immediately re-form as quickly as possible.



In the mean time (Plate 14) the blue reserve is routed and flies, pursued by two squadrons. One squadron red is left with the guns, and the remaining three squadrons, forming quickly, move across the road and form the red reserve. Squadron No. 8, 2nd brigade red has now reformed, and falls on the rear of the blue 1st line which gives way at all points. The two blue succour squadrons which were broken and dispersed by the successive attacks of red Nos. 8 and 7 have been prevented from rallying by the concentrated fire of the red guns and have retreated towards Grézecourt, 10-24 A. M.

Remarks.

Owing to the disposition of the red division, the combats of the first lines and reserves take place synchronously, while the action of the 2nd lines (presently to be considered) occurs subsequently.

The blue reserve, consisting of five squadrons (it will be remembered that one squadron was left with the guns, and two sent in direct support of the first line), is out-numbered, and out-flanked: it also comes under a very formidable artillery fire, and is naturally defeated. The red commander sends two squadrons in pursuit, leaves one with his guns and quickly rallying the three others, moves across the road and takes up a position to support the troops engaged west of the village (Plate 14.)

The red succour squadron, sending a division to the aid of each squadron of the rear regiment of the 1st line, enables them to clear their front and re-form.

No. 7, 2nd brigade red, falls on the rear of the blue line and is very soon afterwards re-inforced by No. 8 of the same brigade, on which the blue line gives way at all points in disorder.

The red squadrons then quickly rally, and the line commanders detail the squadrons for pursuit. (Plate 15).

The action of the 2nd lines.

At 10-18 A. M., it will be seen (Pte. 13), that the first lines are in collision and the hand-to-hand *mêlée* has commenced.

The blue second line, consisting of six squadrons in echelon of wing lines from the left, has crossed the Paris road.

The red second line (six squadrons in echelon and one in support) is advancing to meet them in echelon of squadrons from the right.

The leading red squadron aims at the left flank of the leading blue wing, the others maintaining their proper relative positions. At 10-19'-8" A. M., the leading three red squadrons are in collision with the leading blue wing.

At this instant, the squadron commander of the rear red squadron, seeing his opportunity, stretches out to his left at full gallop, and wheeling, falls on the right flank of the rear blue wing.

The succour squadron immediately fills up the place of this squadron in the echelon. (Plate 14).

Remarks.

When the red second line first arrives in column (Plate 12) on the left flank of the first line, or more properly speaking, the leading brigade,

for we have not to do with lines on the red side, it is open to him to attack how he pleases. He may strike at either flank or the centre of the enemy's second line. He sees their formation, echelon of wings (or regiments of three squadrons) from the left, and very properly resolves to strike at their weakest point *i. e.*, the left flank. There are other, tactical, reasons, for this decision which are, however, outside the limits of this paper.

Having formed his plan, he orders echelon from the right and places one squadron in direct support. In this formation he has many advantages over the blue echelon which have been previously detailed.

The principal one is the complete independence of squadrons, an instance of which has just been given when No. 8 1st brigade without specific orders, but on his own responsibility, makes a flank attack.

It will be observed that the red succour squadron, No. 1 first brigade, fills the place of No. 8 in the echelon.

In this instance, this was unnecessary. This squadron was there to deal with any parties of the blues who might break through and threaten the rear of engaged squadrons. It would have been sufficient if No. 1 had fallen back sufficiently to be in position to fall on the flank of any blues who might have passed through the gap left by No. 8.

General Remarks.

Looking back at the foregoing, necessarily brief, description of a cavalry combat, the first general observation that strikes me is that it is not always good to take the initiative. The blue commander does so here, but his red adversary, seeing his object, is able to thwart it and secure the advantage. This he does, first by the position selected for his guns. By not advancing them unduly, but moving them well to the left of the Bussy road, he causes, by his subsequent disposition of his cavalry, the fight to take place much nearer to his own guns than to the blue battery. As the blue division has acted in the usual conventional way all through, I shall only consider the manœuvres of the red side.

By moving his third and first brigades in the manner described, he allows the blue division to advance to an easier range of his guns, and at the same time keeps his own troops nearly 4,000 yards distant from those of the enemy. The second red brigade having got into the desired position S. of St. Sorlin, halts in line, as this is the most difficult target for artillery. Of course if there was any natural shelter at hand, they took advantage of it, but these points were left out of our consideration. The left regiment, for instance, might very well have sheltered in close formation behind the village of St. Sorlin.

When the blue division forms fighting array at 10-11½ A. M. the red columns take no notice of the manœuvre, but continue their diagonal advance. This forces the blues to make those changes of front which are afterwards so fatal to them, bringing them as they do under the enfilade fire of the red guns.

When the leading red brigade wheels into line at 10-15¼, and advances in double echelon, the first brigade following, by disengaging and passing in rear of the echelon, defilades itself from the blue guns.

The red guns only engage the enemy's artillery for six minutes. At 10-11 they turn all their fire on the blue cavalry, whom they enfilade completely at 10-14. As such opportunities are golden, and also very fleeting, they bring the quickest and hottest possible fire on the blue first line during this crisis, and when it is past, turn their attention to the blue reserve which is closer at hand. By so doing they to a great extent demoralize the blue cavalry, and also (as we have seen) put about two squadrons out of action before the final collision.

After the collision (Plate 14), they by this fire prevent the broken succour squadrons of the blue line from rallying, so that they take no further part in the fight.

The red division, by adopting the echelon form of attack, secure for themselves many advantages, but principally that of being able to manœuvre up to a later moment than their adversaries. After the latter had formed line, the reds had still three minutes left for manœuvring with the head of their echelon, but in three minutes 1,200 yards can be covered at a gallop, or 600 at a trot.

The combat of the reserves take place almost simultaneously with that of the first lines, and the blues being completely routed here, the red squadrons were able very quickly (a single squadron can rally, if victorious, in less than a minute) to rally, and move across to the support of the first and third brigades.

Plate 15 gives some idea of what is meant by squadrons re-forming quickly and affording mutual support.

The manœuvring to the left flank *before* advancing produces the very desirable result that the red guns are not masked up to the moment of the actual collision.

N. B.—In the 4th phase, the leading brigade forms "1st line." This was not by any means imperative. It might equally well have changed direction half left and passed on, the first brigade in rear forming the echelon for attack. In fact, had these troops been under fire of the blue guns this procedure would have been correct, as the passage of one brigade in rear of another under fire would have been inadmissible. Owing to the superior manœuvring of the reds, however, the blue guns were masked by their own cavalry at an early period of the fight.

RECRUITING FOR THE NATIVE ARMY,

By CAPTAIN H. FAITHFULL, 33rd Punjab Infantry.

After the very able paper read by Colonel F. Lance, c. B., on the 3rd August 1890 at the United Service Institution of India, and the publication of the Prize Essays of 1891 on the future recruiting grounds for our native army, it seems very venturesome to hazard any further remarks on recruiting; but as the following notes refer to present difficulties in obtaining men, and have been but casually touched upon in the Essays, I trust my temerity in calling attention to them may be pardoned.

It is generally agreed that all the requirements of the native army in men can be adequately supplied from the present sources without having recourse to Pathan tribes on and beyond our borders: for although there is much to be said in favour of their superiority in certain respects over races already in our ranks, there are undeniable drawbacks to their enlistment in large numbers. If political considerations admitted the extension of our dominion over these tribes so as to include them under the heading of British subjects, in time the recruiting grounds of the native army would be greatly enlarged and benefitted, but as we stand at present, extensive enlistment amongst tribes whose homes are not under our sway seems inadvisable.

The dearth of recruits from amongst races under our rule is usually attributed to the meagreness of the inducements held out to them to enlist: an increase of pay is decidedly desirable and would certainly augment the numbers of recruits, but would it also attract the better men acknowledged to be in the country, but at present holding back from service? So long as recruiting is conducted in the present haphazard manner I humbly beg to doubt it, because these men have weightier objections to our service, particularly in the infantry, than the pittance at present offered them. Let any one inquire carefully from specimens of the right material already in our ranks, and he will ascertain that quite as powerful an objection to enlistment in our ranks as the indifferent pay is "the very large proportion of the wrong material in our ranks."

The majority of officers in the Indian Army still look on a Gurkha as a Gurkha, a Sikh as a Sikh, a Punjabi as a Punjabi, and a Pathan as a Pathan. They either do not know or they ignore the fact, that there are Gurkhas and Gurkhas, Sikhs and Sikhs, Punjabis and Punjabis, Pathans and Pathans. Major Barrow in his Essay touches on this subject when alluding to Punjabi Muhammadans only: there are just as many undesirable men to be found amongst Gurkhas or Sikhs as amongst Punjabis and Pathans. In Captain Vansittart's notes on Gurkhas, page 62, there is a list of the men that should not be enlisted; a comparison of that list and the occupations detailed a little further on in

this paper will show that the north country man has his representative for each one of these. I have no doubt but that the same remark applies to every one of the classes serving in our native army all over India.

From observation when moving in the districts of northern India away from large towns, I have noticed, that from a military point of view, the inhabitants of nearly every village may be generally divided into two parts, the first consisting of the villagers proper, from amongst whom recruits for our ranks should be sought, the second including "their servants, menials, or as they themselves term them, the *kamin log*." This distinction is admirably illustrated in Mr. Ibbetson's Punjab Census report for 1881 in chapter VI, in which he divides them into (1) the landowning classes, (2) the minor landowning and agricultural classes, (3) the religious, professional, mercantile, &c. classes, and (4) the vagrant, menial, and artisan classes. (1) and (2) comprise my first division, (3) and (4) my second. It is not at all an uncommon occurrence to find representatives of the last serving in our ranks, and if the individual has been fortunate, the menial has become a non-commissioned officer and even in some cases has obtained his commission. When such is the case, the corps he honours by representing may be perfectly certain that not one single specimen of the real fighting classes will it ever have in its ranks from anywhere within 20 miles of the home of the lucky menial. There are still very few officers in regimental employ that realize the contempt such upstarts are held in by their village superiors, and what a fatal hindrance they are to recruiting good men. It would surprise some of the regiments in our Indian Army that are supposed to have men of the right class, because those they have come from the right districts, could they but hear the *soubriquets* invariably applied to them amongst the soldiers of the real sort they are supposed to have. We have hardly recognised the fact that our native corps have reputations in the districts, especially amongst the classes they enlist from. Any officer able to converse in the vernacular a little better than the Munshis require to pass the higher standard, if he will spend an occasional ten days, shooting in the districts his own corps enlists from, can verify my statements, and I think he will be surprised, should he try, to find out that corps he has hitherto thought well of, or the reverse, are held in very different estimation amongst our native soldiers. The undesirable material is all to be found in the third and fourth classes as noted in Mr. Ibbetson's Census Report above alluded to; it comprises water carriers, scavengers, leather workers, weavers, grass workers and mat makers, watermen, boatmen, cooks, workers in wood, iron, stone, clay and other metals and minerals, washermen, dyers, tailors, potters, cotton carders, oil pressers, butchers, and distillers and sellers of wines and spirits--a formidable list; and yet there is not any one occupation named that has not a representative in our native ranks: many are very fully represented, such as water carriers, weavers, washermen, dyers, tailors, and oil pressers, even in the commissioned grades.

The religious, professional, mercantile, and miscellaneous castes are not so numerous in the army, the first named alone supplying recruits in any numbers, such as Brahmins and Sayads. A few good men are to

be found in each of these, but great discrimination should be exercised in taking either, and only when it is known that the individual is a land-owner and works his own land, and does not depend for his subsistence on the charity or qualms of conscience of his fellow villagers, should he ever be enlisted.

Mendicants and Ascetics fortunately have not tried to enter our ranks; but Barbers, Bards [*Bhatts, Dums, and Mirassis*], as well as *Raicals*, and *Naths*, are certainly not unknown.

Now it must be remembered that in the above list of undesirable material, individuals are classed by their "occupations," not by their caste or class: remember too that occupation and trade are not always synonymous terms, and that occupations are nearly invariably hereditary, whereas caste, or I should say religion, is now-a-days frequently maintained purely for social purposes. The various undesirable occupations, from a military point of view, enumerated above, are to be found as much amongst Gurkhas and Pathans as amongst Sikhs and Punjabis, and I have no doubt it is just the same amongst all the other races in our Indian Army. Mr. Ibbetson's Census Report para 720 says, "I would separate landowners who cultivate, from those who do not." "It is the status, and not the mere fact of individual property, that is important." It is this very status that we should look to when selecting men for our ranks.

In addition to all the foregoing undesirable material, recruiting in or near large towns should be very limited. The inhabitants of villages in the immediate vicinity of large towns, within say a radius of eight to ten miles, are very little better than the townsmen themselves. The spread of education, being more general amongst the youths bred in such localities, appears unfortunately to have hitherto only developed their worse instincts. At the expense of quickening the faculties employed in mastering the rudiments of reading, writing, and arithmetic, our system of Indian education seems to exercise a demoralising influence on their sentiments of honour, straightforwardness, and courage. Yet another reason for the rejection, or very careful selection, of town bred youths is, that the superfluous menial inhabitants of outlying villages gravitate to the nearest large towns directly their own villages cease to find employment for them, and if in their new locations work is not obtainable, they soon learn that the suppression of their former occupation will occasionally help them to a livelihood by presenting themselves to the first recruiting party they come across. It is far more common to find individuals misleading anyone asking information as to what class a man belongs to amongst the town, than the country youth. The son of the weaver, the mirassi, the barber, the dhobi &c., &c. does not consider it any degradation to own his occupation when in the country, but directly he lives in a town he knows these occupations are looked down upon generally, and if questioned as to who he is, will reply, "I am a Hindu, Sikh, Gurkha, Muhammadan, or Pathan," as the case may be, carefully suppressing the occupation, to make the class apparent.

Having endeavoured to point out the undesirable material which is to be rejected, I beg to suggest some means for inducing the real grit to come forward in our service.

First of all, a very large field lies to our hand untouched in the crowds of men of various races under our standard requirements as regards height alone: one has only to remember that there are more perfectly well developed strongly built men under five feet six inches in height than over that standard. Why not direct the enlistment of all men of the required caste between the heights of, say five feet and five feet six inches, in certain corps? Let them be called rifles if that is considered necessary. There will be no difficulty in getting the required number of men, even if the standard of chest measurement be proportionately higher: this is allowed already for Gurkhas and Dogras. Why limit the field of recruits to these two classes, when commanding officers complain of the scarcity of men of other classes which offer themselves for enlistment?

There are already some very limited areas practically confined to certain regiments, that is, the good material to be found in those areas of certain classes will only serve in certain corps. There is ample room for all the corps we have to possess each its own preserve, if the word is allowable, and so to have an adequate supply of the right material always available. But then each corps must also in other ways, look to its own reputation amongst the homes of the men in its ranks. Contented and discontented corps are very widely known amongst the classes they enlist; a corps in which minor punishments are resorted to for the most trivial failings, in which the man's existence is a constant parade, or as he expresses it, "he never has leisure to slacken his waist belt"; in which the want of sympathy between black and white is apparent; in which deductions from pay are very frequent, in which leave is sparingly and grudgingly bestowed even in the hot weather:—such are some of the points discussed at the villages, and the removal of these causes of complaint lies with the regiment: a disregard of these points will ruin the best recruiting field in India. I have mentioned deductions from pay. Now the men know perfectly well when they are being cut because it is the *sarkar's* order, but they know equally well when the cutting is due to some whim of their commanding officer. If the deduction is to give them some advantage in dress over corps their fellow clansmen serve in, they will never complain, but if the deduction is an extra two annas on the price of a havresack, water bottle, pair of putties, or native shoes &c., extra charges which usually benefit only the contractor for the supply of any of these articles, and perhaps carry a *douceur* from him to some intermediate parties hidden behind the scenes, then the men growl, and the news is spread abroad farther than can be believed. This question of half-mounting charges is known to be very serious and one which requires immediate attention. The state should provide its soldiers with every single article of clothing and necessaries he is made to require as part of his military kit; it is not fair to practically run a recruit into debt for the first two years of his service, as is the case at present.

Class regiments have been freely advocated, and there is not the shadow of a doubt that superior men are attracted to corps in which they have not to rub shoulders either with beings they scorn and hate, or with even those professing another faith. We English frequently, I would say

almost invariably, overlook the fact, that in India the profession of one faith or another carries with it the greatest divergence of social customs and daily life, that acts committed by the one in all sincerity are often loathsome to one holding another creed, that when mixed classes are made to serve together, the relations between them must always be strained, and that very little provocation is required to render them openly hostile to another. Without varying the proportions of each class in our native army, if for political reasons these must be maintained as they stand at present, and even without incurring any fresh expenditure, the class regiment system can now be introduced into our army. The constitution of our present class troop and company regiments merely requires the transfer of whole units from corps to corps, to effect this most desirable reform: in many cases the unit to be transferred would be as large as a wing of a regiment. Colonel King-Harman in his Essay would doubtless have amplified his remarks on this point, had he had the manuals of the Bengal cavalry and infantry by him to refer to.

Omitting all present class corps, the constitution of the Bengal Army at present is,

Muhammadans	{	Hindustanis... ..	26	Troops and	33	Companies.
		Punjabis... ..	32½	ditto	34½	ditto.
		Trans-Border Pathans... ..	3	ditto	19½	ditto.
		Border Pathans... ..	19½	ditto	20	ditto.
Hindus....	{	Sikhs, Jats... ..	52	ditto	70	ditto.
		Dogras... ..	16	ditto	30	ditto.
		Brahmins... ..	1	ditto	21	ditto.
		Rajputs... ..	8	ditto	55	ditto.
		Jats... ..	16	ditto	14	ditto.
		Others... ..	2	ditto	0	ditto.
		Gurkhas... ..	0	ditto	1	ditto.
		Hill men... ..	0	ditto	5	ditto.
		Mixed Company	0	ditto	1	ditto.

We have therefore the material already in our ranks ready trained to give us at once the following class regiments:—

Muhammadans	{	Hindustanis... ..	3	Cavalry	4	Infantry.
		Punjabis... ..	4	ditto	4	ditto.
		Trans-Border Pathans... ..	0	ditto	2	ditto.
		Border Pathans... ..	2	ditto	2	ditto.
Hindus....	{	Sikhs... ..	6	ditto	8	ditto.
		Dogras... ..	2	ditto	3	ditto.
		Brahmins... ..	0	ditto	2	ditto.
		Rajputs... ..	1	ditto	7	ditto.
		Jats... ..	2	ditto	2	ditto.

In the cavalry, besides furnishing the class regiments, there are enough troops remaining for another Muhammadan regiment, and as six and a half of these remaining troops are trans-border and border Pathans, the corps might be turned into a Pathan cavalry regiment. There are also four troops of Sikhs, one of Hindustani Brahmins, and two of other Hindus, so that the elimination of one existing Muhammadan troop and its substitution by one of Sikhs, supplies the material for one more Sikh cavalry regiment.

Similarly in the infantry 35 companies are available, of which three have been entered in the above table as if already existing, namely one of Rajputs and two of Jats, to complete the requisite number of companies to form the number of regiments shown above; of the remaining 32 companies, seven and a half are trans-border and border Pathans, these might conveniently have half a company raised, and become a Pathan infantry corps. Six more companies are Sikhs, and six are Dogras, which if similarly treated would furnish one more regiment of each of these excellent classes. Five companies are hill men, one a Gurkha, and one a mixed company, which gives nearly the whole material for another battalion of hill men.

Existing class troop and company corps are more affiliated in the native ranks than is usually known, not necessarily by the numbers they have had officially assigned in linking them together in the infantry. It is not uncommon to hear men speak of those, nominally of their own class, who are serving in other corps as "good" or "bad", say, Sikhs. A little enquiry will elicit this partiality, and by arranging the transfers, suggested above, accordingly, any little soreness that might be felt at severance from corps they had so long served with would be completely obliterated. The fact has but to be announced that the *Sarkar*, with a view to the contentment and welfare of its soldiers, is arranging for these to serve with their co-religionists, and there is very little doubt but that the men themselves would suggest the most desirable transfers. There is no necessity to move one troop or company of any one class to one regiment, and a second troop or company of the same class in that regiment to a third regiment.

Sir John McQueen's excellent note on recruiting published in No. 88 of the United Service Institution Journal, 1890, indicates the direction in which reforms are required. He enumerates the great difficulties and wearisome delays usually attending the enlistment of men, and points out how greatly these can be smoothed over by the presence of a British officer with the recruiting party. One has only to instance the reputation of any of our Gurkha battalions, to prove the enormous advantage a corps has, when the enlistment is thoroughly supervised: the officers hitherto selected for this very important duty have been carefully chosen for their knowledge of Gurkhas. A comparison of the names of the native officers even in any list, say 10 or 15 years ago, and a list in any Gurkha corps to-day will show at once that the undesirable material I have before detailed has been almost completely eliminated, that the men now in the ranks do not contain many menials amongst them. In the particular case of Gurkhas the identification and rejection of these is rendered easier by the occupation being frequently denoted by the man's name, whereas with Sikhs, Pathans, or Punjabis such is not the case, and identification is consequently more difficult.

For horses for our native cavalry a specially qualified officer is selected to attend fairs, and, may I say, enlist horses, and even mules, for our regiments; the appointment is well paid, and only naturally so, considering the immense responsibility it involves. Are the animals that carry the fighting men of more value than the men? An officer has to be

chosen who has proved he knows the requirements of the native army in horse flesh ; quite so. Similarly for recruiting the men for the ranks, officers should be selected who are known to have more than a passing acquaintance with the classes of men to be enlisted ; even without going to the expense of making new appointments, very much can be done to improve the class of men taken into our regiments, by deputing an officer accompanied by a medical officer to attend the principal large fairs and gatherings held all over India, to pass recruits for any corps requiring the classes of men usually attending these fairs. The dates of all these *fêtes* or fairs are as well known to the natives frequenting them as Christmas is to us ; they themselves can tell you the right fairs to attend, to find any particular class of man. The information might be collected and tabulated at Army Head-Quarters and distributed to the corps concerned.

Granted as much as this, before commencing work with the British officer, let each corps requiring men of the class to be found at any particular fair, detach a small recruiting party to the district in which the fair is held to hunt up men for it, and also to spread the news that a British officer is coming to enlist such and such classes of men for such and such regiments, the civil authorities being requested to assist. If each corps detaching recruiting parties sent in a roll of the men employed, these rolls could be collected and forwarded together to the officer selected to attend the fair. With the present disposition of the Bengal Army it will be easy to find one officer with the requisite knowledge of either Hindus or Muhammadans, serving with some corps at no great distance from the scene of any large fair. For instance, Sikhs are required, take the big Baisakhi fair at Amritsar ; there is sure to be a well qualified officer within, say, 200 miles of Amritsar. Let corps requiring Sikhs send in the names of their recruiting parties to Army Head-Quarters, say, six weeks beforehand ; these rolls should be forwarded to the selected officer, and the corps concerned informed that an officer, accompanied by a medical officer, will be present at the fair between certain dates, and that all recruiting parties are to report themselves to him, and to take up any recruits they have to him to be passed. The amount saved to Government in the railway fares of recruits at present rejected as unfit will more than cover any extra expense the attendance of the officers at the fair may cost. If the British officer detailed is allowed the assistance of a native officer, one in whom he trusts, it will be invaluable in detecting undesirable material that endeavours to palm itself off as the genuine article. The wisdom of the present system of verification after enlistment is theoretically admirable, but practically very questionable in the case of low caste classes. When these possess the nous to palm themselves off as genuine, they generally also have the sense to pave the way over future difficulties by an appropriate *douceur* to the village lumberdar and village policeman, this latter being really the more important of the two, as he usually comes with the verification roll and gets the lumberdar's signature to the correctness of the entries contained in it. It is not unknown in cases when the gratuities demanded have been refused, that the roll has been returned, in the case

of good man, to say that they were falsely entered. I would trust the caste entry to my recruiting party; the men of the regiment will let you know if undesirable material is being brought in, and should this ever occur, very summary punishment of the responsible man will effectually check any more of it.

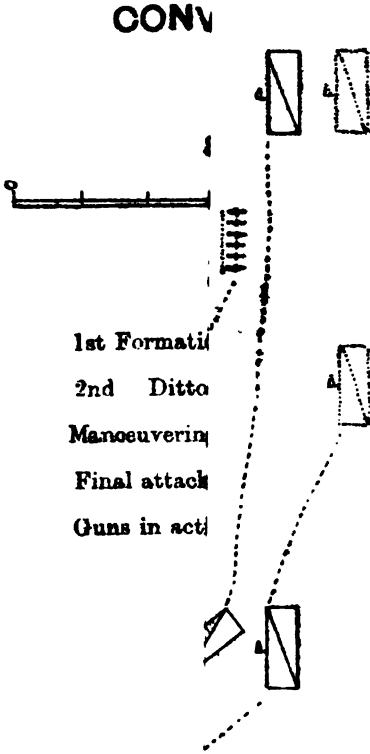
When speaking of the social status of native officers of cavalry and infantry, one frequently hears that the class found in the former will not serve in the latter: they certainly will not, so long as so much inferior material is to be found in the ranks of the native infantry, sometimes they even refuse a commission. In the cavalry scions of good families are taken as recruits, on the understanding that if during their training they show any aptitude, they will not be put into the ranks as sowars, but will be given lance rank and on further acquaintance will be promoted, rapidly or in turn, as they prove their fitness: I believe I am not wrong in stating that some of our best native officers in the cavalry have obtained their commissions in this manner. Are there any cases of it in the infantry? Such men are accustomed from childhood to exact obedience from those about them, and the majority of those serving with them are frequently drawn from the very classes these have commanded all their lives, and they are obeyed naturally, not through any fear of regimental punishment. Another very great advantage in having some of these men in our non-commissioned grades is that they attract other good men, and their own natural repugnance to associate with the inferior classes can be made of the greatest assistance in keeping all undesirable material out of our ranks.

It has not been denied throughout the above, that a more liberal scale of pay, clothing, half-mounting &c. (all meaning increased expenditure to the state) is very desirable. I have merely endeavoured to show that more can be done to improve our native ranks than is at present effected, although we have all the means at our disposal.

(Sd.) P. NEVILLE, Major.

Positions at 10.18 A M

Plate 10.



THE COLLISION, 10-18 A. M.

(Sd.) P. NEVILLE, Major.

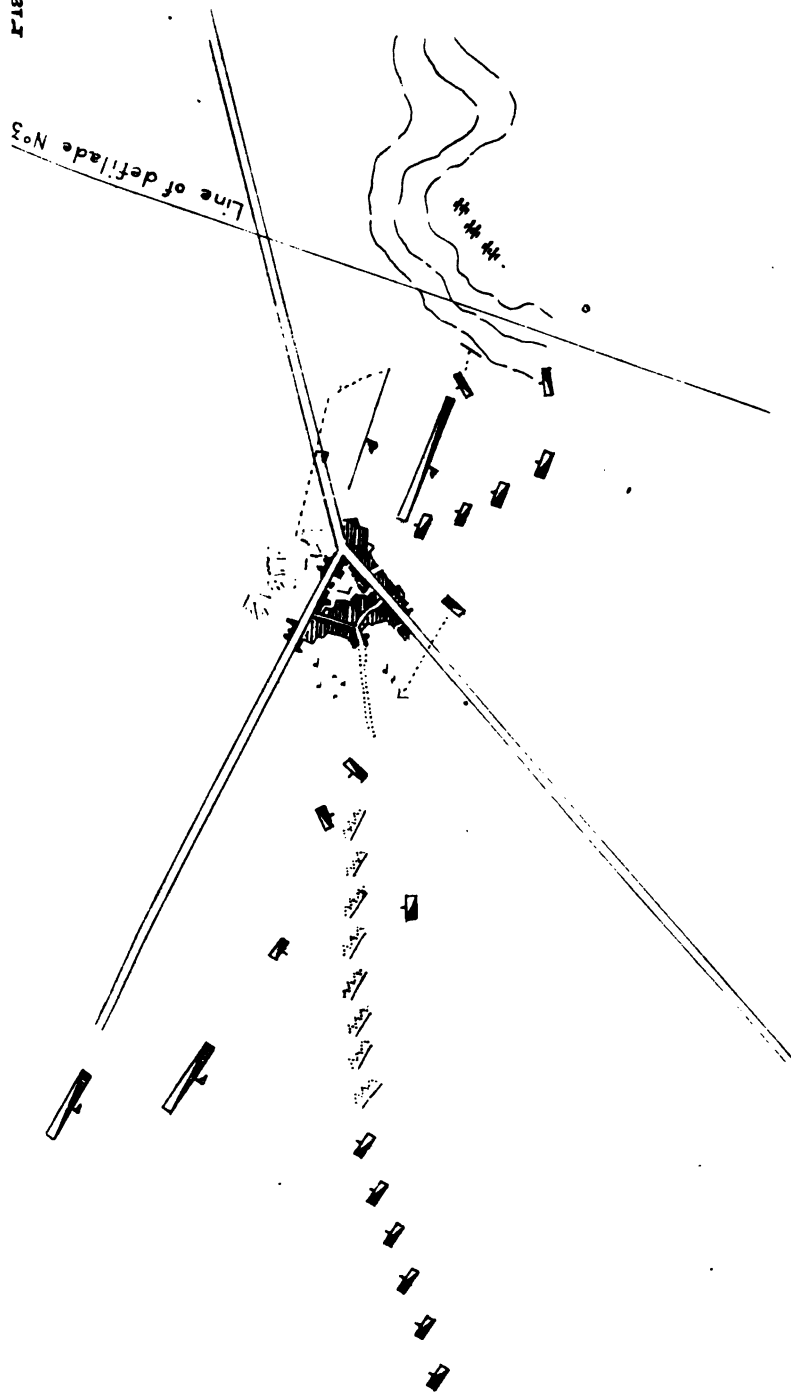
Positions at 10-18 A. M.

(Sd.) P. NEVILLE, Major

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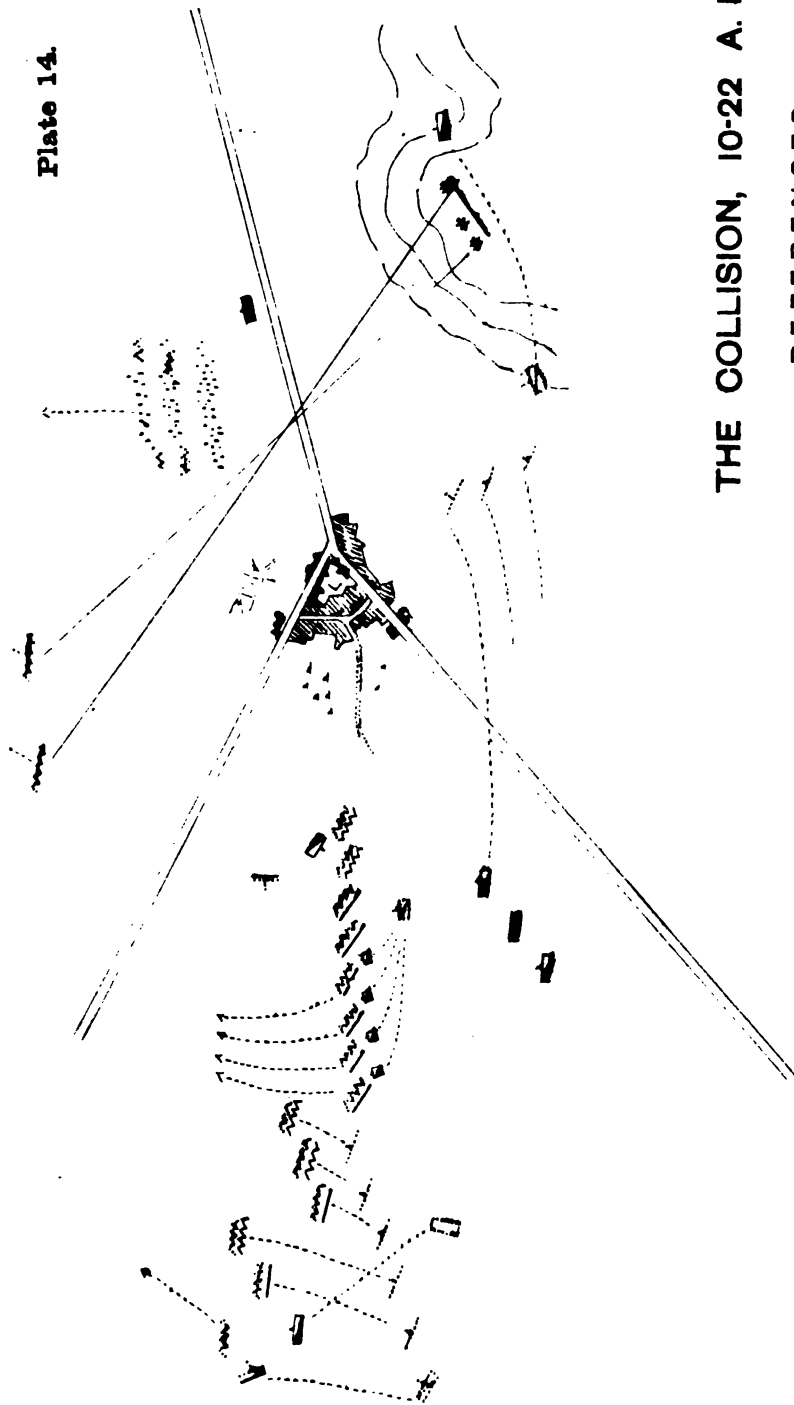


THE COLLISION, 10-18 A. M.

(Sd.) P. NEVILLE, Major.

Positions at 10-18 A. M. ...





THE COLLISION, 10-22 A.M.

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(Sd.) P. NEVILLE, Major.

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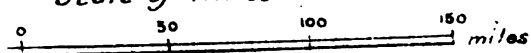
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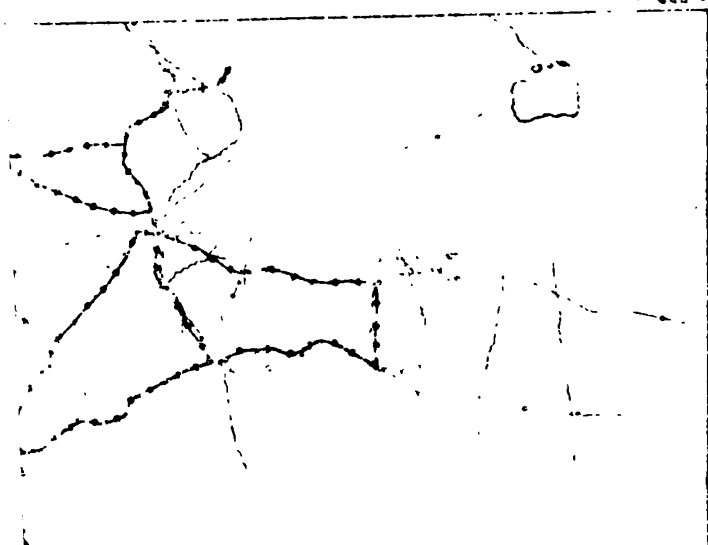
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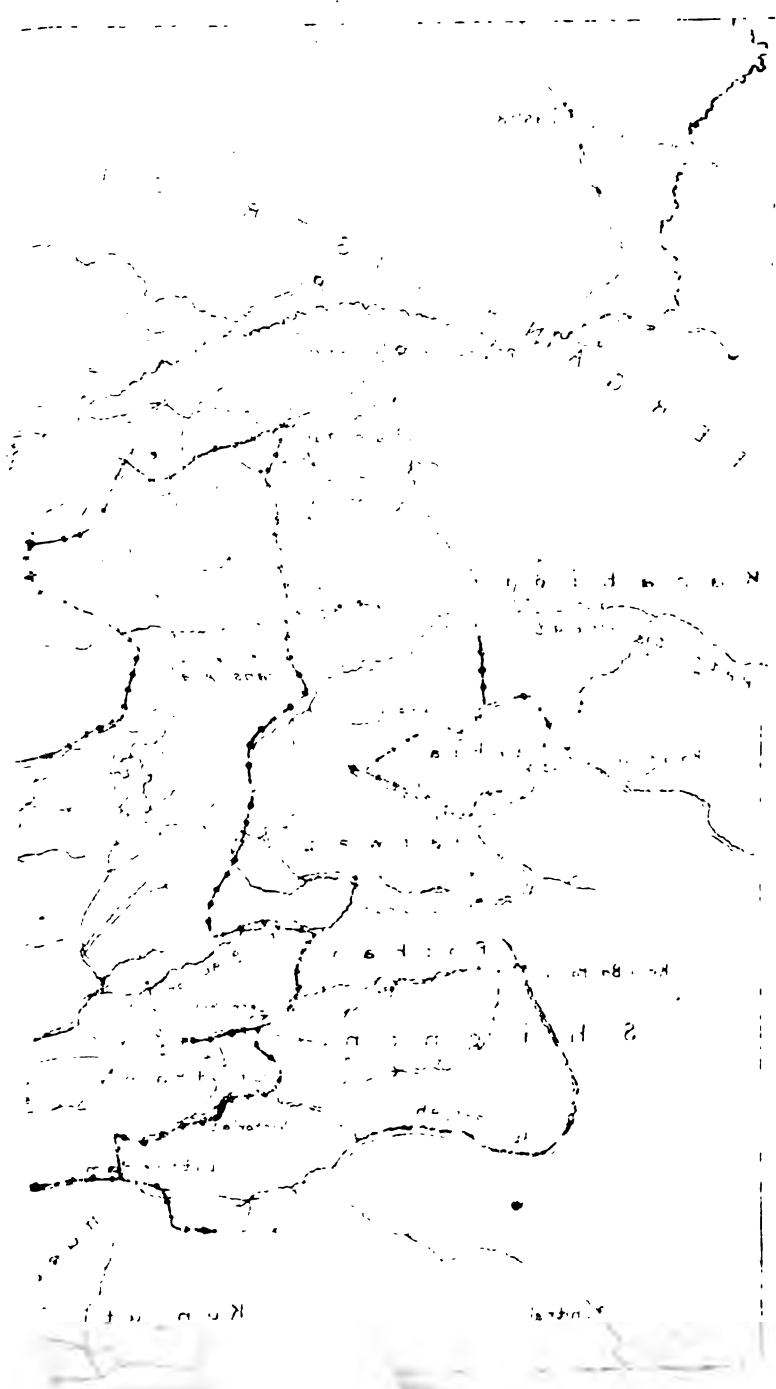
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GROMCHEFSKY'S EXPEDITION 1889-90.

Translated by Captain E. F. H. McSWINEY, D. S. O., 4th Lancers. H. C.,
Attaché, Intelligence Branch,
Quarter Master General's Department.

Captain Gromchefskey's Report of his Journey in 1889-1890,
Read before a Special Meeting of the Russian Imperial Geographical
Society, the 10th January 1891, with a route map attached.

Two years ago I gave an account of my journey beyond the Hindu-Kush to the Russian Imperial Geographical Society. I then visited the wild Khanate of Kandjute, and my journey besides adding something to science, showed the necessity of exploring the neighbouring Khanates to Kandjute, which were also almost entirely unknown.

The Council of the Society unanimously concurred with my proposition, and through the minister of war obtained His Majesty's permission to send me on duty beyond the Hindu-Kush, in order to explore the Siah-Posh, a country better known under the name of Kafiristan or the land of the "unbelievers."

The cost of the expedition was defrayed by the Tzarevitch. The departure of the expedition for the country beyond the Hindu-Kush took place at the time of the defection of northern Afghanistan and its subsequent recapture by the Afghans.

As it was already well known at St. Petersburg that the political state of affairs were unfavourable for the objects of the expedition, the Council proposed, that in case it was found impossible to reach Kafiristan, I was to proceed along the eastern slopes of the Hindu-Kush and explore the sources of the river Raskem Daria, the north eastern slopes of the Himalayas, and the frontiers of north-western Thibet. Various circumstances, but chiefly the loss of part of our baggage between Odessa and Uzun-Ada, delayed the equipment of the expedition, and I was only able to start on my journey from Margilan in the Ferghan district on the 1st June 1889.

Besides myself the expedition consisted of seven Cossacks of the Orenburg regiment, Mr. Conrad, and four natives. Out of the numbers of my escort only my Cossack orderly Kazakayeff, the Tadjeeck Mirza Fazul Beg, and Sahrt Sadir Khodja Eman had accompanied me before in my previous Kandjute expedition.

The late and cold spring of 1889 retarded the usual melting of the snows on the hills. This was followed by intense heat. The snow melted rapidly, the mountain streams overflowed their banks, and whilst rushing down broke down bridges, and in many places destroyed the road.

The rivers were in flood when the expedition started, and during the first few days of our march we had very hard work in having to make bridges and repair the roads.

On entering the valley of Great Alai we shaped our course towards the Trans-Alai range of mountains, intending to descend into Shughan after crossing the Kadar and the Pamirs.

Great Alai Valley.
Trans Alai Mountains.

The Trans-Alai range, however, was found covered with snow, which had already become so soft that it could no longer bear the weight of a horse, mountain torrents were flowing everywhere, the crossing of which was effected with the greatest difficulty; the melting of the snows was accompanied by terrible avalanches.

— Muk-su River. We crossed the river Muk-su at great danger but did not succeed in getting over the Trans-Alai range.

Having tired and worn out our horses we were compelled to retrace our steps to the Alai Valley. The above mentioned circumstances forced me to turn westwards, and to march to Shughan by a circuitous route *via* Karategin, Wakhia, and Darvaz provinces of eastern Bokhara.

Karategin is a continuation of the Alai Valley, and is situated on both sides of the Surkh-ab or Red River. The population here is partly Kirghese and partly Tadjeeck.

The Kirghese Tadjeecks live in houses and villages in winter only, and during the summer in the mountains grazing their cattle.

Karategin is a poor country, but possesses sufficient suitable soil for agricultural purposes as well as rich pasturage on the northern slopes of the

Peter-the-Great range. Of wild animals we only saw wolves, foxes, martins, marmots, and hares; of game birds we only saw the ptarmigan. The bearded eagle is often met with here, regarding whose intelligence many stories are told amongst the local population. For instance on bearded eagles seeing a herd of horses, they watch them until they pass along some narrow ledge, then swooping suddenly down upon them they attack them by blows on the head with their wings. This frightens the young horses, who rush over the precipices and thus become the eagle's prey at the bottom. It is also stated that eagles are particularly fond of marrow, and that in order to obtain this luxury, they will soar up with bones to a great height and drop them on to the rocks below, where the bones are shivered in pieces, and the eagles obtain what they want.

From Karategin we passed over the Peter-the-Great range through the Kardari-Kaftar Pass, and entered Wakhia, a small district situated along both banks of the river Hing-ab or Muddy river. On the Peter-the-Great range we saw wild goats grazing on the lovely pasture with Alpine vegetation; we here also noticed an unusual number of marmots. The mountain slopes are covered with luxuriant grass, which attracts large numbers of the nomadic population even from the interior of Bokhara.

There are a number of small lakes in these mountains, abounding in wild fowl and especially the red Pamir duck.

Wakhia.

The district of Wakhia is composed entirely of Tadjeecks.

They are of Arian origin, are tall, dark skinned, with thick hair and handsome regular features. They are a poor tribe which is due to

their indolence, for compared with other parts of Central Asia, we saw in Wakhia a great deal of land very suitable for cultivation which had not been touched by the people. During our advance we passed through villages full of green gardens. Here grow the walnut, apple, plum, and cherry trees. Of grains, wheat, barley, beans, and hemp are sown here. The last mentioned is sown solely for the purpose of obtaining linseed oil, and the stalk is utilized for fuel, for the preparation of hemp fibre is unknown in Wakhia as well as in other parts of Central Asia.

From Wakhia through the Goshon Pass over the Darvaz range, we

Darvaz.

descended into Darvaz, and on the 7th of July arrived at Kala-i-Khum, the capital of Darvaz. It probably got its name Darvaz from the word "Darvaza,"

meaning gate, because the river Pianja

Pianja River.

here bursts through a mountain gorge, and flows through a narrow defile like a gateway.

The wise men of the place, however, derive its name from the words

Dar-Baz, a rope dancer, and connect it with the following legend. During the life of Mahomed the prophet, his son-in-law Ali was sent to capture Darvaz, but in consequence of the heroic defence by the population against the Arabian army, it was found impossible to capture the place by force of arms. He then decided to circumvent them by artifice, and having dressed himself as a Dar-Baz he proceeded to the capital, the present Darvaz. The people of Central Asia up to the present day are passionately fond of rope dancing, and in order to witness it, they collect from the most distant settlements. Even at such an out of the way place therefore as Darvaz, for the sake of such a holiday, the whole population of the country round collected here, and so carried away were they with excitement, that they did not notice the approach of the Arabian army up to the walls of the city. Ali, who was sitting high up on his rope, of course saw how his army approached the city gates, and on giving an agreed upon sign, pretended he was tired, and descended to the ground, and there killed the governor of the district with a dagger at the very moment the latter was presenting Ali with a gift. At that very moment Ali's army broke into the town, massacred the population, and annexed the country, which in commemoration of the above event was called by the Arabs "Darvaz." Darvaz, as well as Karategin and Wakhia, have only belonged to Bokhara for 13 years. This district is situated along both banks of the river Pianja, which flows through a defile in places not wider than 700 to 840 feet. Here in contrast with Wakhia and Karategin every bit of ground is sown and well cultivated. The houses remind one of the mud huts in Little Russia, except that they are plastered with some peculiar composition of alabaster which gives them a polished appearance.

Vegetation in Darvaz, notwithstanding its great altitude above the sea level, is astonishing. Grapes, pomegranates, and figs are never covered up during winter, yet notwithstanding grow to an enormous size. Wild grapes are met with in the mountains.

Peaches, apricots, apples, pears, plums, and walnuts grow in Darvaz, and extensive plantations of mulberry trees. However, the natives do

not cultivate the mulberry tree on account of the silk worm but for the sake of its fruit. This tree is very fruitful, the fruit ripens in the early spring and lasts all through the summer. The natives endeavour to water the mulberry trees as little as possible, for too much water makes the fruit watery and less sweet. The mulberry as well as the peach and apricot, form the staple food of the natives, who dry these fruits and lay in a stock for the winter, grind them in mills, mixing wheaten flour with the ground mulberry, and use it for bread making. The people of Darvaz are Tadjicks of pure Arian type and very handsome. The women are especially good looking with pale sombre faces, regular features, and beautiful eyes. They belong to the Muhammadan faith, and are devoted to their former Shah, being hostile to the Bokharan power. The women do not cover their faces on meeting men, but most of them did so on meeting with us strangers. Unfortunately the idyllic beauty of the Darvaz women is marred by their great dirtiness. They never wash their linen, but go on wearing it until it rots off their shoulders; of course from living under such conditions the people are eaten up with parasites.

Filth and immorality create numerous diseases, amongst which predominate syphilis, skin and eye diseases, and infectious fevers. Eye diseases are very prevalent owing to the very hot climate of Darvaz and the constant dust storms. During our stay at Kala-i-Khum the heat even at 9 P. M. used to register from 30° to 31° C.

The dust is caused by the wind blowing up the sand from the sand banks of the river Pianja, which, in consequence of its rapid current during the whole summer, cannot be crossed in boats. Communication is kept up by means of "musssocks" made of the skin of the goat, sheep, horse, or cow. These skins are inflated. The swimmer grips them tightly with his knees, and with his left hand pressing the opening by which they are inflated, throws himself fearlessly into the roaring torrent, swimming and guiding himself with his right hand.

The crossing is very dangerous, requiring great knack, and, only possible amongst people brought up from childhood to consider water their natural element. For transporting loads across the water from 15 to 20 musssocks are inflated and tied together. Such a raft covered over with planks will carry 50 "poods" (2,000 lbs.), and is worked by four swimmers. During winter at low water the crossing of the Pianja is effected by means of clumsy Bokharan boats called "Caiques."

The equipment of the expedition for a further advance detained us at Kala-i-Khum for another five days. Here we received the first correct news of affairs in northern Afghanistan, which was that the Ameer Abdur Rahman Khan had succeeded in reconquering the alienated provinces of Char Vilayet and Badakshan, and that the Afghan army was advancing on Shughnan. Fearing lest the warlike state of affairs might prevent the passage of the expedition through Shughnan beyond the Hindu-Kush, I entered into correspondence with the Governor of Shughnan, Sayad Akbar Shah, and advanced rapidly up the course of the river Pianja.

The road lay along the right bank of the river, and for long distances is cut through the rocks or along narrow ledges overhanging

precipices. These ledges were in many places so narrow, that we were obliged to carry our packs over by hand, and our horses, without saddles even, we led over with difficulty, putting a running noose round neck and body in case of accidents. Near the boundary of Roshan the road for several miles had been destroyed by landslips. We found it impossible to repair it, and were consequently obliged to go through the very difficult pass of Akbar-i-Auzbai.

On the 20th July we reached the frontier of Roshan, and were met by a messenger with a letter from Akbar Shah, in which the Governor of Shughnan announced, that notwithstanding the Afghans had taken possession of half his territories we should be his welcomed guests. At the same time Sayad Akbar Shah warned me that all the roads leading out of his territory were in the possession of the Afghans, and if I intended to proceed further to the Hindu-Kush, then it would be absolutely necessary for me first to obtain the sanction of the commander of the Afghan troops. With a view to this I wrote a letter to Shah Sayad Djarnel, the Afghan commander, and sent it by Maston, an Afghan officer whom I had rescued from slavery from amongst the Kirghese of the Trans-Alai mountains. This officer had accompanied us for a month and a half, and being personally convinced of the thoroughly peaceful and scientific objects of the expedition, could certify the fact to the Afghan commander. An answer was soon received from Shah Sayad Djarnel, informing me that without the Ameer's sanction he could not allow the expedition to enter the country; he also requested me immediately to leave the frontiers of Afghanistan, and in order to watch our movements sent a strong detachment of cavalry, which took up a position on the left bank of the river Pianja opposite to our camp. Only the river separated us, which at this spot is only about 600 to 700 feet wide.

Knowing that the Afghan army was excited by the war, and fearing a sudden attack, I retired to the centre of the valley of the river Wanj, in order to escape any untoward collision. Here we received the news that the governor of Shughnan had shut himself up in Kala-i-Vamar, the capital of Roshan, prepared to make a desperate resistance, and that the Afghans had already commenced the siege of the place. As there was no road to the Pamir from the Wanj valley, I was compelled to recross the Darvaz range through the very difficult pass of Seetargi, and descend into Wakhia. Both slopes of this pass were covered with ice, and the glacier of the western slope extends for a distance of about nine miles.

Moving across this glacier was not only difficult but very dangerous. There were deep fissures in the glacier, over which we had to pass and lead our horses, making a way over with boards. To finish with eastern Bokhara, I may add that the population in the Wanj valley is Tadjeeek and chiefly agricultural. The rich iron ore deposits at the sources of the river Wanj afford good means of employment to the population, and nearly every house possesses a furnace for smelting iron. Wanj iron is so celebrated, that it has an enormous sale, not only in eastern Bokhara, but also in Badakshan and the Pamir Khanates. Be-

sides this the inhabitants of Wanj are great sportsmen, especially after the wild goat of which there are great numbers in the mountains.

A special breed of grey-hounds is kept for this particular sport.

After the expedition had descended into Wakhia another letter was received from Shah Sayad Djarnel, informing me that he had sent my letter on to the Ameer for disposal, and would communicate Abdur Rahman's orders to me. This circumstance compelled me to march for the Pamir by a round-about route through Karategin and Kudaru, and to await the reply near the borders of Afghanistan.

While on the road along the boundary of Kudar we visited the stronghold of the famous Pamir brigand, Sahib Nazar. This brigand enjoys such a legendary fame amongst the population for hundreds of miles round, that I expected to see a terrible looking warrior, and was very much surprised, when Sahib Nazar entered my camp accompanied by his sons and suite, to meet a weak and very ugly-looking old man.

There are legends innumerable about him, and nearly every bit of

Pamir.

ground on the Pamir is connected with his name. For instance on the Little

Pamir there is a spot called Saudagar Tepe, i.e. the merchant's hill, where Sahib Nazar and his band of robbers generally laid in wait for and robbed the passing caravans, which were on their way from Badakshan to Kashgar. On one occasion, hearing that there was a rich caravan proceeding along this road accompanied by 47 armed traders, he concealed his band in an adjacent defile, while he himself disguised in poor clothing started off to meet it, and having made friends with the chief of the caravan, helped him in a few small ways by shewing him where water, forage, and firewood were to be found, and by so doing so greatly won the confidence of the chief as to be allowed to graze the horses. Having reached the spot where the gang was concealed, Sahib Nazar drove away all the caravan horses at night, called out his men, killed the traders, and seized all the goods. You can have an idea of his daring by the fact, that soon after our occupation of the Ferghan district, he in company with ten men entered the valley of Great Alai, and drove off a thousand head of horses belonging to our subjects, some of whom were killed by him.

After greeting me, Sahib Nazar entered into conversation and told us many anecdotes of his life which had been so full of adventures. He concluded with a very characteristic story. Complaining that his strongholds now adjoined the great powers of Russia, China, and Afghanistan, and that there was no longer any field left for daring exploits (for he had spent the whole of his life in brigandage but now in his old age wished to make his peace with God and man), he dismissed his gang, and calling up his sons, under the threat of refusing them a parent's blessing forbade them any longer to engage in brigandage.

For three years he led a God-fearing life, but nevertheless all the robberies that occurred even at great distances from him were always laid to his charge. His neighbours thought his repentance weakness, and endeavoured to avenge the evil of years.

Once his son Khuda Nazar, who had gone into the Alai valley, was seized by some Alai Kirghese, who fortunately not recognizing that he was the son of Sahib Nazar, but thinking he was only a relative, bound him and were about to bring him before the Headman of the village. The lad knowing he would be recognized and would have to pay the penalty, seized the opportunity, when one of the Kirghese, who was escorting him and riding on the best horse, came up to his side, to suddenly snatch his sword from him, and by a dexterous blow to fell him from his horse, on to which he jumped in the twinkling of an eye, and so effected his escape. The capture of Khuda Nazar greatly incensed the old man. He remembered the old Kirghese proverb, "That whether the wolf steals sheep or not, blood is always seen on his mouth";—that is, he is always suspected of being the thief. He therefore sent for his sons and gave them his blessing for the achievement of new exploits. To us personally, Sahib Nazar behaved very, kindly and, for money, provided us with guides and provisions. I was particularly pleased with his warm mention of former Russian expeditions, *viz.* Savertzoff's, Putiatin's, and the brothers Grim-Grijimaila's. After giving presents to Sahib Nazar we parted friends. Amongst other things we learnt from him that Kala-i-Wamar had already been taken by the Afghans, that Sayad Akbar Shah had fled across the frontier of Bokhara, and that the Afghans were administering the regained provinces with unheard of cruelty. The inhabitants of Shugnan consisting of about 2,000 families had fled to the Pamir, some hoping to save themselves from the barbarities of the Afghans within the boundaries of Russia territory, and some in Sarikol, which is chiefly inhabited by emigrants from Shugnan. The local Chinese authorities on the Pamir under various excuses detained the fugitives until the arrival of the Chinese troops. On the arrival, however, of Djan Dareen, the Chief of the entire frontier, with two regiments of cavalry, the Shugnan fugitives were mercilessly driven back into Shugnan, when the Afghans, forewarned by the Chinese, sallied out to meet them, and treated them with terrible cruelty.

From Sahib Nazar's nomadic camp we descended into the valley of the river Murgh-ab, where during the three days journey we encountered dense crowds of Shugnan fugitives seeking refuge in Russian territory from Afghan torture.

We marched for three days along a road literally strewn with carcases, the decomposition of which produced such a stench, that in order to encamp at night the expedition was forced to move well away from the road. Everywhere we met sick, weary, and wounded people. Long files of women were seen marching along with babes and small children in their arms and on their backs. In short we saw at every step such dreadful scenes of human suffering, which are possible only in Asia, where a ruler after seizing the country of another, considers he has the right of destroying the whole population and turning the country into a wilderness. We bandaged up the wounded, gave medicine to the sick, and shared our scanty stock of provisions with them, but all this was as it were but a drop in the ocean.

The river Murgh-ab was in full flood, and three times we had to cross it swimming. When we reached

Murgh-ab.
Yashil-Kul.

the Yashil-Kul lake on the Pamir, we found ourselves between the outpost

lines of the Afghan and Chinese troops, who perpetually annoyed us.

I could not leave the Pamirs, as I was expecting an answer from Abdur Rahman Khan as to whether he would permit me to enter Kafiristan. I was obliged to employ all my energy and knowledge of local conditions to avoid a conflict, as undesirable with the Afghans as with the Chinese. The local Kirghese population refused to supply us with anything, and we were obliged to rely upon our guns for food. As a climax to everything, a severe autumn set in. The Pamirs were covered with snow, and it was very difficult to procure fuel from beneath it. Life in tents at the then existing low temperature of 20° C. was very trying.

Under the unfavourable conditions of constantly moving about from place to place, we spent nearly all August and September on the Pamir. At last on the 1st October we received a reply from Abdur Rahman Khan absolutely declining to permit us to pass into Kafiristan. Then, feeling we had done all that was possible for human beings to do towards the accomplishment of our object, we commenced the fulfilment of the second part of the instructions given me by the Council of the R. I. G. Society; so proceeding along the Hindu-Kush and Mustag and over the Raskem range of mountains, we descended into the valley of the river Raskem Darya. So as not to refer again to the Pamir, I will only add that this tableland lies between the Alai range of mountains and the Hindu-Kush, and that its average height is from 12 to 13,000 feet. The Amu Darya takes its source from this plateau. The sources of the Amu Darya flow along four longitudinal valleys, the bottoms of which are covered with lovely grass, affording pasturage for large herds of the *Ovis Poli*. On the Pamirs we met with bears, asiatic panthers, wolves, wild goats, foxes, marmots, martens, &c., and on the lakes countless flocks of ducks, geese, and all kinds of wild fowl. In the rivers and lakes such quantities of fish abound, that, for instance, in the river flowing out of the lake Bulun-Kul, with only one cast of a small drag-net, we caught two and a half pounds (100 lbs.) weight of very delicious fish. There is such an abundance of fish here, that even bears live upon them, picking them out of the water with their paws.

There are no trees on the Pamirs. We only met with foliage along the river Murgh-ab. I call the whole of the plateau "Pamir" by reason of the great similarity of the valleys. As a matter of fact, the locality

Pamir.

known under the name of "Pamir" is understood to be only the valley of the

Great Pamir lake and river Pamir. The remaining places are known by other names, as for instance lake Yashil-Kul, the valley of the river Alichur, and the Aksu valley &c., &c. Yashil-Kul is the largest lake, being more than 24 miles long by nearly four to five in breadth. Innumerable legends are associated with this lake, in which the fertile

imagination of the nomads has endeavoured to express its enthusiasm and explain the majestic phenomenon of nature.

I will here recall one of the legends describing the origin of the lake Yashil-Kul. In ancient days, says the legend, on the spot where the lake now exists, there was a large town, the population of which had become so steeped in sin, that they had even forgotten the sacred laws of hospitality. On the eve of the solemn festival of the "Eed" a stranger appeared in the town. He visited all the houses but none of the occupants would take him in. The stranger was leaving the town with the intention of camping out in the fields for the night, when almost on the out-skirts of the town he once more knocked at the house of an old woman. This woman invited him to spend the night under her roof, and in order to feast him killed her last goat.

On the morning of the "Eed" the stranger told the woman to go and see what was going on in the town. On going to her gate and looking out, to her horror she saw that the town no longer existed, and in its place there were nothing but surging waves. The old woman's house now appeared to be situated on a cape, almost entirely surrounded by water, and only connected with the adjacent hill by a narrow strip of land. When the old woman in her flurry returned to the room to tell the stranger what had happened, she found he had vanished. The cape, however, on which the old woman's house stood, exists to the present day, and is known amongst the Kirghese by the name of "Chooka-Kampir" i. e. "old woman's cape."

The Pamirs are far from resembling a wilderness. Here there is a permanent population residing throughout summer and winter.

The population is small, but not in consequence of the natural conditions of life preventing its further increase. The Central Asian nomad is so simple, that he is quite accustomed to the rough surroundings of life on the Pamir, and having pasture for his cattle would remain contented, if the natural increase of the population was not retarded by the constant raids made upon it, even up to almost recent times, by the neighbouring semi-independent Khanates. The present conditions of life have much changed, and the population is very distinctly increasing. But notwithstanding the close proximity of Russia and the comparative civilization of China, slavery still flourishes on the Pamir, the slaves coming chiefly from the provinces of Chitral, Yasin, and Kandjute Khanates, coming under the influence of England.

We found the Raskem range covered with snow, and had to trans-

Raskem Mountains. port our heavy baggage on Yaks.

Descending into the richly wooded basin of the Raskem Darya we revived ourselves from the cold, and escaped from the depressing feeling of

Raskem Darya. constant danger. In camp we now heard the hitherto long unsung Cossack song. In the Elisú stream, one of the tributaries of the Raskem Darya, we found a natural hot spring bath, the temperature of which reached 47° Celsius. The beds of the hot spring were deepened, over them a covering of branches was made, and we felt at home in having the luxury of a hot bath. We spent October and November in

surveying the basin of the Raskem Darya, and during a period of 55 days only twice met with people, *viz.* Captain Younghusband's expedition, and a band of brigand Kandjutes proceeding on a marauding excursion along the caravan road from Yarkand to Cashmere. Captain Younghusband had marched from India to Kandjute. He was a young man who had gained a name for himself by his plucky journey from Pekin through the whole of China to Cashmere. He was accompanied by a small escort of Bengal cavalry, pundits, and numerous servants. We met on very friendly terms, and as my expedition had already encamped for the night before Captain Younghusband's arrival, he became our guest for nearly three days.

Both expeditions presented an interesting mixture of twenty nationalities. Our meeting with the Kandjute brigands took place at the source of the river Saltor, a tributary of the Raskem Darya.

In order to husband the strength of both men and horses as much as possible, I generally left all heavy baggage on the main road, and made lateral excursions with only one or two followers. During one of these trips, when only accompanied by the Cossack Matveyeff, towards evening we came suddenly upon some fires. As during the space of 40 days, we had met no one, this sudden meeting with numerous fires alarmed me. I dismounted from my horse, and hiding myself in the undergrowth, crept as near as I could to the spot occupied by the strangers, whom I recognized as being Kandjutes to the number of about 80 men, who were doubtless on their way somewhere to raid.

Knowing their customs I did not consider it wise to go amongst them alone, therefore waiting until it was dusk and having muffled our horses' hoofs in saddle cloths and led them as carefully as possible along the stony bed of the river, we hastened to rejoin the expedition from which we had been some 80 miles distant.

Two days after this same band of Kandjutes reached the halting place of the expedition, and on seeing us sent two of their number over to negotiate with us. They were informed, that irrespective of my friendly feeling towards the ruler of their country, my prestige as the subject of the Great White Tzar prohibited any one being robbed in my presence. Although I felt sure the band was not directed against the expedition, still I nevertheless imperatively demanded that they should return to their homes, and that I should consider their re-appearance within gun-shot of the expedition as an act of open hostility towards us.

The Kandjutes, after again sending envoys to me with messages of loyalty and goodwill, retired. I learnt afterwards, that by my firmness and resolution, I had saved the life of a Kirghese from Shahidulla Khodja, who had accompanied Captain Younghusband, and was on his way back with money earned for the transport of heavy baggage. We explored the basin of the Raskem Darya for a distance of 1,000 miles.

This basin is most suitable for cultivation, and bears traces of it in the shape of ruined villages, reservoirs, irrigation canals, &c. The extensive and neglected cemeteries in this wilderness produce a particularly sad impression. Each little pathway, every little projecting spur, are covered with the ruins of fortifications. It is evident that the former

inhabitants here fought to the very last, not wishing to forsake their homes, and retreated only under compulsion. The valley of the Raskem Darya has become a wilderness through the systematic raids of the Kandjutes; when that took place it is hard to say, for the dry climate of the country helps to preserve the traces of cultivation. So it appears almost as though this place were only abandoned yesterday, whereas the most careful inquiries proved that Raskem had been a wilderness within the memory of the fathers of the present generation. The hills surrounding this valley in consequence of the unusually small quantity of moisture, are quite destitute of vegetation. Vegetable growth is only possible at the bottom of the valley, i. e. in places which can be artificially irrigated. The sand banks, however, in the river were covered with luxurious foliage, consisting of mountain poplar, willow, gigantic thistles, tamarisks, wild roses, &c. &c., all being interwoven with creepers of all kinds, and forming such a dense jungle that we were obliged to use our axes to cut a way through for ourselves.

In this same valley we met with wild sheep (Popai), red goats, antelopes, herds of wild asses, asiatic panthers, wolves, foxes, martens, ptarmigan, several kinds of duck, two kinds of Himalayan pheasant, and numerous small birds. Besides this we were able to shoot a few small weasels and ermine.

During the last few days of November there were always from 24° to 27° Celsius. Both sides of the river Raskem Darya were frozen over, whilst the middle of the stream remained open, along which flocks were passing. Horses with heavy packs had to enter the water three and four feet deep, and from that depth to scramble out again on to the slippery ice. In short the crossing of the ford was very difficult.

On the 25th November we reached the fort of Shahidullah newly reconstructed by the Cashmerees at a height of about 2,500 feet.

Seeing the impossibility of traversing the Thibetan wastes during the winter, I wrote to Colonel Nisbet, the British Resident in Cashmere, for permission for the expedition to winter in Cashmere, and at the same time took active measures to lay in a stock of provisions. Near

Shahidulla Khodja.

Shahidulla Khodja, we came upon 20 Kirghese "Kibitkas" (felt tents), the

men of which were engaged in guiding caravans over the Himalayas into Cashmere, so we applied to them for provisions, but found they had none, and we were therefore obliged to send to Kashgar for the purchase of all necessaries.

Taking advantage of the time required for bringing in the supplies, I left the expedition near Shahidullah Khodja and accompanied by two of my men started for the Kara-Korum Pass, 18,550 feet. We met with a very cold reception on this cold plateau; 35° Celsius of frost with a bitter wind compelled us to return after only accomplishing half the distance to Kara-Korum. On the road we passed a spot called the "Valley of Death." Here lay the carcasses of horses and scattered bales of merchandize, but no human beings. It turned out that the caravan of the Cashmeree Alik Bey had been overtaken by the frost. Having lost their horses, the people in charge of it abandoned the goods and fled to Shahidullah Khodja.

Our supplies arrived on the 14th December, and rumours reached us that Colonel Nisbet had issued instructions to prevent our expedition entering Cashmere. I then decided to move up the river "Kara-Kosh," get on to the Thibetan plateau, and endeavour to strike across it so as to reach the inhabited parts of Thibet.

After examining, on the road near Shahidullah Khodja, the deposits of nephrite, already described by Shlagintveit, and which are poor in comparison with what I had seen the previous year along the bank of the river Rashkem Darya, on the 20th December at an altitude of nearly 15,000 feet, we parted with the last signs of the tamarisk, left the bed of the Kara-Kosh river, and ascended the Thibetan plateau, the average height of which here reaches 17,000 feet. This part of north-western Thibet represents a wilderness in the full sense of the word. The country is undulating and intersected in all directions by low mountain ridges, innumerable deep basins which contain more or less deep lakes. The soil is sandy and subsaline, and there is absolutely no vegetation with the exception of sparsely scattered tufts of yellow coarse grass, and even this, such as it is, is only to be found in these hollows and nullahs, over and through which the water from the infrequent rains and melting snows in the mountains, flows. In spite of this scarcity of flora we met with herds of wild asses, sheep, reddish-looking goats, and peculiar kinds of yaks; we noticed a wolf following in the track of these animals, of birds we only saw the carrion crow. There was continuous frost of from 33 to 35° Celsius, accompanied by bitter winds, which by mid-day had become a hurricane. It was so cold that tears, caused by the wind, froze on the eye-lashes before they had time to roll down the cheeks. There was no snow. All the springs were frozen, and we obtained water for our tea by melting the ice. Our poor animals remained unwatered. During those difficult days, our privations were almost beyond endurance.

From enquiries made, I knew that along the road, in the Urung-Kosh basin, we should meet with hot springs, but days passed and we marched from day-light until dusk, yet still failed to reach the springs. After a three days journey along the Thibetan plateau we approached the great range separating the river Urung-Kosh from the basin of the river Kara-Kosh. Having found a pass over it about 19,000 feet high, we proceeded onwards in the morning. The horses broke down from thirst, and I felt that the end was approaching. Nevertheless I was obliged to advance at all hazards, as were I to turn back and not reach water, neither the horses nor the people could have borne another march over the desert. On 29th December 1889 we marched all day without halting, and only reached the hot springs at one o'clock at night, having lost a third of our horses and abandoned part of our baggage in the desert. The water of the spring appeared to have such an unpleasant taste, that even the horses drank it with reluctance. On the following day the mortality amongst the horses continued. To complete our misery a snow storm commenced. The bare land became covered with a thick snow carpet, and our guide refused to lead us any longer.

Having rested for twenty-four hours at the hot springs, I decided to turn back. As we were now unable to carry our loads, we were obliged to collect all that was valuable and pile it into a separate heap, which we covered with felt and stones, so as to preserve it from the winds and the curiosity of wild animals. We threw away all less needful things, and took with us only our diaries, surveys, instruments, arms, and the little sum of money I still had by me.

On the 31st December 1889 we began our return journey, and halted for the night at an elevation of 18,000, at the foot of the pass we had traversed the day before, which I called "Ruskim."

A snow storm and hurricane raged with great force. We all huddled into the only remaining tent we possessed, which had been presented to me before leaving Petersburg by H. I. H. the Grand Duke Demetrius Constantinovitch, and endeavoured to warm ourselves by means of our own breath. I don't know what my followers felt, but, personally, it seemed as though we were being frozen and that there was no escape for us. Knowing from long experience that the severest snow storms cease before dawn, punctually at midnight we made a last effort and crawled up to the pass. There were yet twelve versts to the highest point of the pass.

Day dawned at 7 o'clock, consequently, proceeding at the rate of two versts an hour, we could reach the top of the pass by daybreak. This time fortune favoured us, for during our ascent the snow storm abated and we reached the summit amid almost perfect calm. On reaching the top I waited for my companions, and letting them pass on in front of me, I was the last to descend. We were nearly all frost-bitten, and had only just begun descending from the pass when the snow storm began again with renewed force, but it did not present its former danger, as we were partially sheltered by the surrounding mountains.

On the 4th January 1890, after spending nearly eleven days in an altitude of 17,000 feet, we again arrived at the bed of the river Kara-Kosh at the spot which we left on the 26th December last. After this I entered into negotiations with the Kirghese, who were encamped near Shahidullah Khodja, and who received us in the most friendly manner; they brought out tents and provisions for us, and sent out five camels to bring in the things we had abandoned in the waste. The Kirghese brought a Cashmere officer with them, who handed me three letters from Colonel Nisbet, the British Resident in Cashmere. These letters, identical in tenour, had been despatched by different roads. They conveyed the refusal of the Indian Government to admit the Russian expedition within the borders of Cashmere. The Cashmerees confirmed the news we had already received to the effect that all the passes leading into Cashmere were held by Cashmere troops. As the expedition was now quite disorganized, we went on to Shahidullah Khodja, and thence over the high Kiliang pass descended into Kashgar, arriving at the village of Kiliang on the 8th February, where after an eight months' residence in tents, we found ourselves for the first time in a house.

Out of the 36 horses with which I started from Shahidullah Khodja in the middle of December, only eight returned, and even they were unfit for further service. Part of our equipment had been abandoned and a part had become quite unserviceable; our money was all gone, and we were in such a plight that we should have been quite satisfied could we have safely reached Margilan.

At this trying and difficult period Jakov Jakovitch Lutsh, the Secretary to the Russian Consulate at Kashgar and the then acting chief, came to our rescue by sending me 4,000 roubles, not knowing whether I should ever be able to return him the money. This money enabled us to re-equip ourselves and to carry on our further operations.

Having failed from the west, I thought we might be able to enter Thibet from the north.

About the middle of February we proceeded further eastwards along the northern slopes of the "Kuen-Lun." At the top of Khotan I learnt that Colonel Peftzoff's expedition was wintering in the Nia Oasis, and that one of the members of the expedition was in Khotan. Of course I hastened on to Khotan, where we were heartily welcomed by the geologist of the expedition, Mining Engineer Bogdanovitch. As my instruments had suffered a great deal, I proceeded to Nia to have them verified, and chiefly to connect my astronomical work with Colonel Peftzoff's.

On the 7th March I arrived at Nia, and met with a most cordial and hearty reception from the members of the Thibet Expedition. I spent a whole week amongst my kind friends, and thanks to their tender care, I obtained both physical and mental rest. Colonel Peftzoff personally verified my instruments, and entered their adjustment in the expeditionary journal.

On the 15th March, having bade farewell to Colonel Peftzoff and his companions, I went south to the gold mines at Sorghak. The gold mines are situated in a sandy locality, which is a perfect waste, to which water is brought from a stream eight miles distant, and the most trifling stores from Nia. The population live in caves of conglomerate rock, and in wattle huts made of plaited reed matting. The absence of water prevents the huts from being even plastered over with clay, so for instance at the local caravanserai, the occupant of one room can see what is going on in the next. Notwithstanding the early season of the year large numbers of people were working at the mines. Gold is found principally in the old dried up beds of rivers. It is not found in veins but is alluvial. Prior to reaching the gold-bearing sand, it is necessary to sink a pit 140 feet deep. The gold-bearing sand is brought to the surface in bags by means of a capstan, and then owing to the absence of water and the consequent impossibility of washing it, it is sifted in the air. By this means the gold is not blown away by the wind, but falls on to a woollen carpet spread on the ground for that purpose.

From Sorghak, I proceeded along the Tokuz-Davan range to Polu, where the late lamented Prejevalski had been before me. The inhabitants

Polu.

of Polu gave me a friendly reception, meeting me a long way outside the village and bringing with them portraits of the Emperor, Empress, and Tsarevitch, which had been given to them by the late Nicolai Michaelovitch Prejevalski.

I was much impressed by this meeting, and a friendly feeling was immediately established between the members of the expedition and the inhabitants, which neither the hostility of the Amban of Keria, nor the strict regulations directed against the expedition, could shake. We spent Easter at Polu with as much gaiety as possible, a great festival having been organized for the inhabitants.

On Easter Monday, leaving our heavy baggage at Polu, I proceeded to Keria at the Amban's invitation, in order to make the acquaintance of the local Governor of the district, and to obtain a stock of supplies necessary for a second ascent into Thibet. The Kerian Amban on the plea of sickness declined a personal interview, and in addition to this issued an order prohibiting the local population from selling us anything. The Chinese soldiers, generally most insolent, were evidently courting a rupture with us. Knowing their cowardice, I came to the conclusion that they were acting under superior orders, and for this reason changed my quarters to the outskirts of the town, on to an open spot, where at any rate we could defend ourselves. Just at that time I received a message from my orderly Kazakaeff, who had been left in charge of the heavy baggage, informing me that a Chinese official had appeared at Polu, and with the aid of the inhabitants was destroying the road from Polu to Thibet. This road leads through a narrow defile with overhanging slopes, the path often winding alongside precipices and over ledges, the destruction of which would cut off all means of communication. Of course I immediately hastened back to Polu. The Chinese official, on hearing of my arrival, fled over the mountains to Keria, whilst I, with the active assistance of the inhabitants, began repairing the damage done to the road by the Chinese. A wearisome correspondence soon began with the Governor of Keria, who obstinately insisted on my turning back and absolutely declined to allow me to pass into Thibet, basing his refusal on the fact of my having no Chinese passport. As I refused to obey the Amban's orders and busily prepared for my journey, the latter sent a cavalry detachment against the expedition with orders to arrest us by force, if within three days we did not voluntarily retire from Polu. Knowing we had a large supply of cartridges and that we could defend ourselves for some time, I was nevertheless fully conscious that sooner or later the Chinese would get the better of us.

To surrender ourselves voluntarily to the Chinese and so risk losing our diaries, surveys, scientific collections, &c., all so dearly obtained, I certainly could not do. To march into Thibet without resources was impossible, for large supplies of dry forage, flour, and farinaceous food were necessary with which to cross the wastes. Not having any store-houses, in the wastes of Thibet we could not proceed further. At this critical moment, we obtained the sympathy of the

Polu inhabitants, who agreed to supply us with the required number of baggage animals and bearers, and to bear the wrath of the Chinese for the assistance given us. As a reward for their services, I gave the Polu people all my supply of silver amounting to about five yambs or 600 roubles.

At daybreak on the 5th May we commenced our march, and on the 10th May reached the Thibet tableland.

It proved, however, that we had ascended at the wrong time of the year. The plateau has an altitude of over 16,000 feet, and life on it had not yet commenced; the glaciers and snow had not yet begun to melt, and water was obtained with the greatest difficulty. The temperature stood at 20° to 24° Celsius of frost, which we felt all the more keenly, as only a few days before we had been living at Keria and experiencing 31° Celsius of heat in the shade. Such an extreme change of temperature told very seriously upon our transport animals, which began to die. Notwithstanding all this, we explored the country over a considerable area, and our work in the N. W. part of Thibet was confirmed by astronomical stations. This plateau resembles very much the more westerly portion which we visited during the winter. It is also the same kind of saline sandy waste, intersected by low mountainous ridges forming deep valleys with enormous lakes. Only here there is infinitely more grass, and there are also more wild animals especially Yaks, who roam about in small herds. Besides this our journey proved that the road from Polu, through N. W. Thibet, leading to the inhabited parts of Thibet, is only difficult for the first three days, that is, along the bed of the river Kurab, but beyond that is quite easy. However, travelling in this part of the country is only possible during three months of the year, from the commencement of July to the end of September.

Not being able to stay long enough on the tableland to await the coming of the warm weather, we returned to Polu, and on the 5th June went on to Khotan, where we came in for an influenza epidemic

Khotan.

in all its severity. This malady having gone the round of Europe, appeared in Turkistan in the winter, in the spring found its way across the Tian-Shan mountains, and moving still further in an easterly direction reached Khotan by the end of June. There had been some sporadic cases even at Polu, which stands at an elevation of 9,000 feet. The influenza spared scarcely any of my followers, finding a fertile field for its development amongst constitutions weakened by privations. It gave me an exceedingly severe shaking, as I had not thoroughly recovered from the severe illness I had last autumn.

July, August, and September we devoted to the exploration of the basin of the river Teesnaf, the average current of the Yarkand Darya and the eastern slopes of the Kashgar range, *i. e.* localities almost entirely unexplored by Europeans. The basin of the river Teesnaf afforded science an exceptionally rich harvest, being almost entirely populated by, ethnographically speaking, very interesting mountain tribes.

The first intimation of the existence of these mountain tribes was made known to the civilized world by Forsyth's expedition of 1873-74.

The information, however, was far from accurate, inasmuch as no member of Forsyth's expedition actually visited them, and was only obtained by inquiries. I visited the mountaineers in the winter, and during the summer of last year I made myself acquainted with their habits and customs. As their chief characteristics were mentioned by me in my letter of the 10th December 1889, printed under head of "Intelligence," in the Imperial Geographical Society's Journal Vol. XXVI. pages 94-100, I will not repeat myself by referring to them again.

Towards the end of August we arrived at the town of Yarkand, where we again met Captain Younghusband's expedition, which having returned to India in 1889, was again sent out in the following spring to Kashgar, elaborately equipped by the Indian Government.

On this occasion Captain Younghusband arrived before me at Yarkand, and endeavoured to repay me for the hospitality I had shewn him some months previous in the desolate basin of the river Raskem.

Having explored the eastern slopes of the Kashgar range, we reached Kashgar at the end of September, and from here, after having taken

Kashgar.
a little rest at the hospitable house of the Russian Consul, N. F. Petrofsky, we proceeded along the right bank of the river Kizil-su past the head waters of the river Margan-su, and again entered the Great Alai Valley, arriving at the town of Osh in the Ferghan district on the 15th October, after travelling for nearly seventeen months beyond the boundaries of Russia.

The results of our journey are as follows :—

- 1.—A survey of 7,200 versts, of which 5,000 versts was over country hitherto unexplored by Europeans.
- 2.—The survey has been confirmed by 73 astronomical observations, connected alike with the surveys of Colonel Pevtzoff, as well as with the labours of the Pamir expedition of 1883, and the work undertaken at different times by the English.
- 3.—Three hundred and fifty altitudes determined by means of the aneroid and boiling point thermometer.
- 4.—Meteorological observations were taken systematically three times a day throughout the whole period of the expedition.
- 5.—Rich geographical and ethnographical material was collected and illustrated by 240 photographs of types and views.
- 6.—Notwithstanding the fact that we had to abandon a considerable portion of our collections on the Thibet plateau last year, we returned with three large boxes containing a zoological collection, a collection of birds, eggs, reptiles, and invertebrate animals, a small herbarium, an entomological collection, a small geological one, samples of nephrite from all the known deposits in Kashgar, also a collection of implements used for the working of nephrite.
- 7.—A diary was kept throughout the whole period of the expedition comprising four large volumes. All the scientific material collected by me has been placed at the disposal of the Council of the Imperial Geographical Society of Russia.

(Received from the Intelligence Division, War Office.)

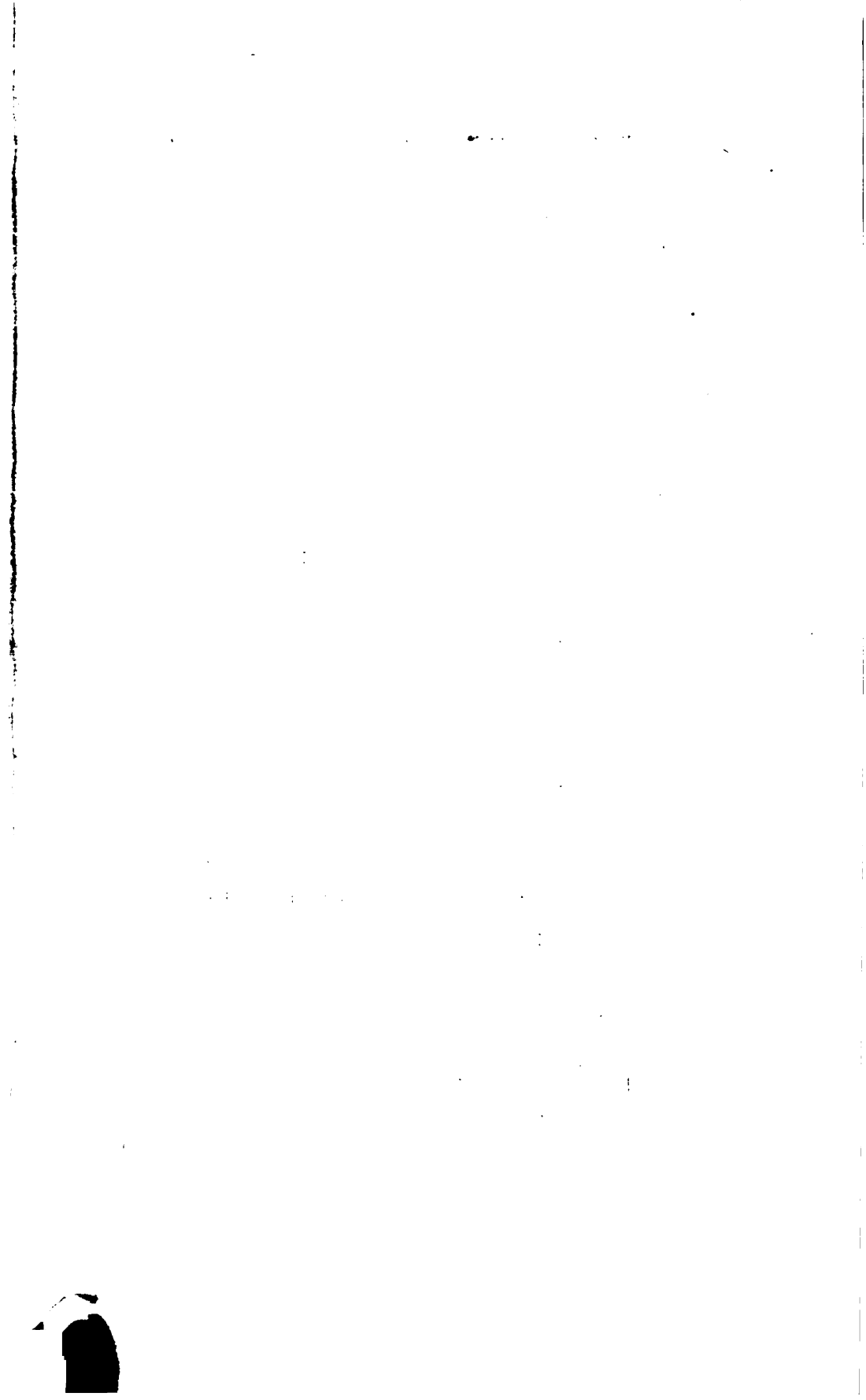
Rifles.

MODERN MILITARY RIFLES AND CARBINES.

[illegible]

Carbines.

Country.	Designation.	Single loader or Magazine.	Weight (about).	Calibre.	Sighted to	Magazine.					
						System.	Fixed.	Has Magazine & cut off?	In Magazine.	Extra round in chamber.	Total.
Austria ...	Model 1890 ...	M.	7 4	.315	yards	Mannlicher	Yes	No	5	0	5
Belgium ...	Werndl (being superseded) ...	S.L.	7 4	.432	...	...	...	...	...	...	...
Bulgaria ...	Comblain ...	S.L.	7 1	.433	...	...	...	...	...	...	...
Denmark ...	Berdan ...	S.L.	7 6	.420	...	...	...	...	...	...	...
Denmark ...	Remington ...	S.L.	...	.433	...	...	...	...	...	...	...
Egypt ...	Martini-Henry ...	S.L.	7 10½	.450	1,180	...	...	...	...	...	...
England ...	Martini-Henry ...	S.L.	7 10½	.450	1,180	...	...	...	...	...	...
France ...	Berthier ...	M.	...	.315	...	Berthier ...	Yes	...	3	1	4
France ...	Carbine /88 ...	M.	6 13	.311	1,200	Mannlicher	Yes	No	5	0	5
Germany ...	Gras ...	S.L.	7 11	.433	...	...	...	...	...	...	...
Greece ...	Remington ...	S.L.	7 3	.433	656	...	...	...	...	...	...
Holland ...	Vetterli ...	S.L.	7 4	.407	1,100	...	...	...	...	...	...
Italy ...	Murata ...	S.L.	...	...	...	...	...	...	...	...	...
Japan ...	Kropatschek ...	M.	8 13	.315	1,035	Kropatschek	Yes	Yes	7	1	8
Portugal ...	Martini-Henry ...	S.L.	7 10½	.450	1,180	...	...	...	...	...	...
Roumania ...	Berdan ...	S.L.	7 6	.420	933	...	...	...	...	...	...
Russia ...	Koka-Milanovich ...	M.	7 4	.385	...	...	Yes	No	3	0	3
Serbia ...	Remington ...	S.L.	7 3	.433	660	...	...	...	...	...	...
Spain ...	...	In experimental stage	...	...	...	...	...	...	...	...	...
Sweden and Norway ...	Vetterli ...	M.	7 0	.409	1,913	Vetterli ...	Yes	...	7	1	8
Switzerland ...	Winchester ...	M.	...	.450	1,000	Winchester	Yes	Yes	10 or 14	1	11 or 15
Turkey ...	Martini-Henry ...	S.L.	7 10½	.450	1,180	...	...	...	...	...	...
United States ...	Springfield ...	S.L.	6 14	.450	1,200	...	...	...	...	...	...



LIST OF NEW MEMBERS.

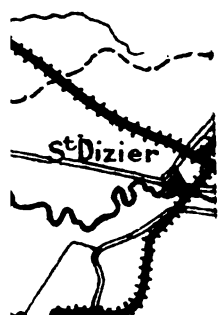
Rank.	Name.	Corps.
2nd Lieutenant ...	Alexander, H.S. ...	16th Madras Infantry.
Lieutenant ...	Archer, C....	Foreign Department.
Captain ...	Borradaile, H. B. ...	32nd Pioneers.
Lieutenant ...	Brooking, H. T. ...	21st Madras Infantry.
Captain ...	Campbell, F. ...	D. A. A. G. for M.
Captain ...	Crowther, R. T. ...	23rd Pioneers.
Lieutenant ...	Davison, G. C. ...	Leinster Regiment.
Captain ...	Douglas, G.P. ...	Queen's Bays.
Captain ...	Fasken, W. H. ...	10th Bengal Lancers.
Lieutenant ...	Forth, W. ...	30th Punjab Infantry.
Major ...	Francis G. T. ...	5th Bombay Cavalry.
Lieutenant ...	Hodson, G. B. ...	Q. O. Guides.
Surgeon-Major ...	Johnson, E. R. ...	I. M. S.
Lieut.-Colonel ...	Kirkwood, J. ...	6th Infy. Hyd. Contingent.
Lieutenant ...	Lee, A. W. H. ...	16th Madras Infantry.
Lieutenant ...	Lyne, C. V. N. ...	16th Madras Infantry.
Captain ...	Pennington, R. L. A. ...	Northd. Fusiliers.
Lieutenant ..	Rennick, F. ...	40th Bombay Infantry.
Colonel, C. I. M. ...	Robertson, J. ...	Retired.
Lieutenant ...	Stewart, J. A. ...	No. 2. (Derajat) M. B.
Captain, D. S. O. ...	Willcocks J. ...	(Leinster) S. S. O. Delhi.

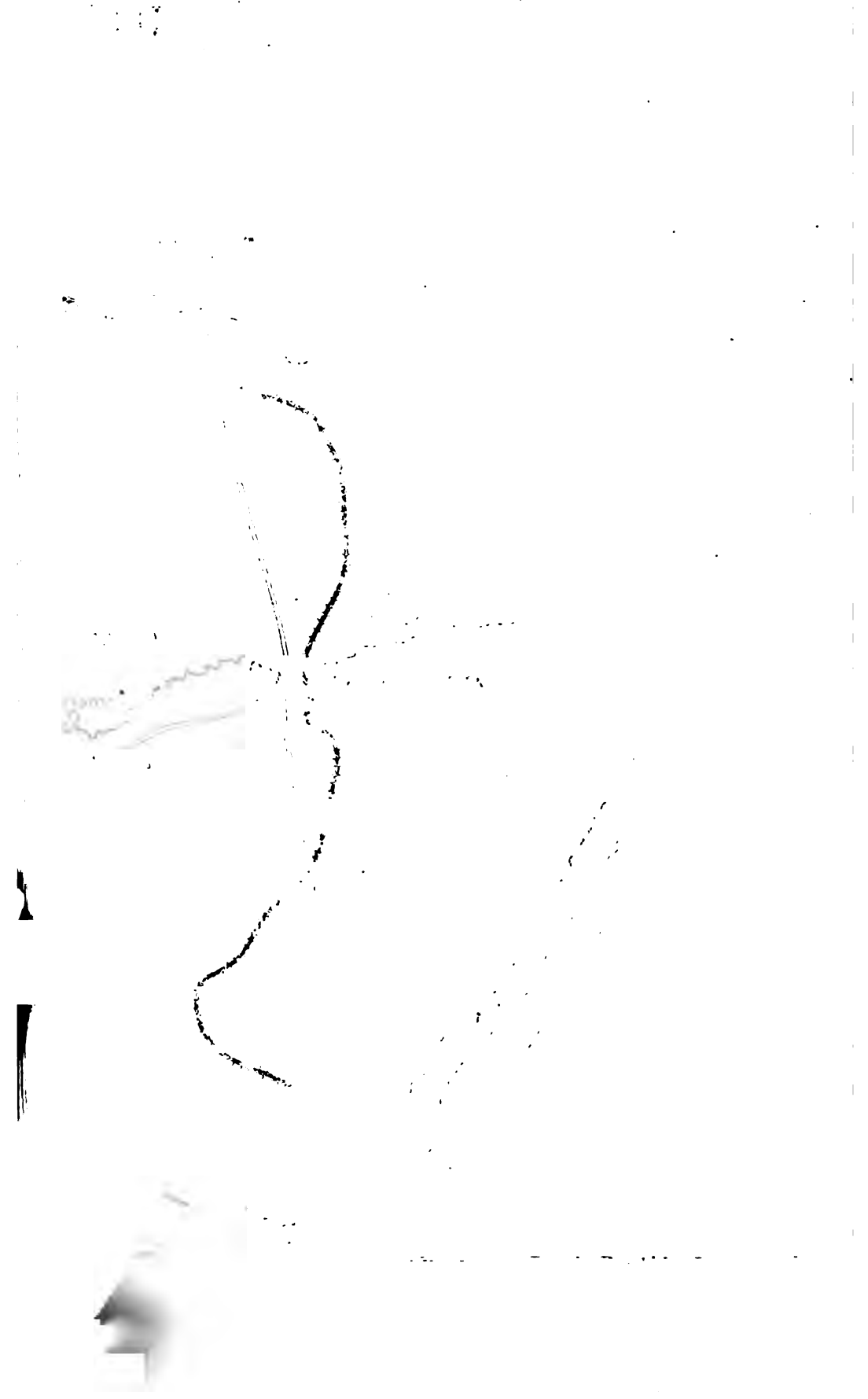
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M.	474 (a)	War	Col. Frederick Maurice	1	1891	
		Professional papers of the Corps of Royal Engineers Vol. XVI.	Capt. W.A. Gale R.E.	1	1890	
M.	739 (a)	Decisive Battles since Waterlo, 1815 to 87	Thomas W. Knox ...	1	1881	
G.	121 (a)	Travels with the Afghan Boundary commission	Lieut. A.C. Yate ...	1	1886	
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		Artillery Drill	5	1891	





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THE FRENCH MANŒUVRES OF 1891.

Translated from "*L'Italia Militare e Marina*,"

By Major A. MONTANARO, 16th (Lucknow) Regiment Bengal Infantry.

The great manœuvres lately held in the east of France have deservedly attracted the notice of all the Great Powers, for never before have such huge masses of troops been gathered together for peace manœuvres. A total of no less than 120,000 men were assembled on the frontier under a single command, and comprised four army corps, as complete as they could be, of which two—the VI and VII, had even an increased establishment, as they were destined to protect the eastern frontier.

The scene of the manœuvres was the triangle formed by Vitry-le-François on the north, and Troyes and Chaumont on the south—it is in fact the district of Champagne, a dreary and monotonous region, consisting of undulating ground with a clayey soil, where drinking water is scarce, and the population thin and scattered. The hills are crowned with woods of fir, favourable for concealing the movements of troops, and the bottom of the valleys is interspersed with bushes. Going from west to east, the country improves as regards the picturesque; but it is an awkward country for an army to occupy, as offering but little hope of benefit or assistance in the way of supplies &c., that could be derived from the population.

The mobilization for these manœuvres commenced on the 18th August and ended on the 1st September; and the following were the troops engaged and their distribution on the evening of the 3rd September:—

Director-General of the manœuvres, General Saussier.

Chief of the General Staff, General Miribel. Head-Quarters, Bar-sur-Aube.

Commander-in-Chief of the western army, General Gallifet.

Head Quarters, Brienne-le-Chateau.

V Army Corps, (General Gallaud)—Thenneliers.

9th Division.—Villechétif and environs.

10th Division.—Courteranges and environs.

Marine Infantry brigade.—Dosches, Laubressel (near Troyes).

5th Cavalry brigade.—Piney.

Artillery of the V Corps.—Ruvigny-Montaulin.

VI Army Corps,—General Jamont, Isle-sur-Marne.

11th Division. { Between the Marne and the Cheronne,
distributed among the villages of Arzil-
liers, Blaise, sous-Arzilliers, Saint
6th Division. { Georges, St. Remy-en-Beauzement.

4th Battalion Chasseurs—Moncets l' Abbaye.

Commander-in-Chief of the eastern army, General Davout.

Head-Quarters, Chaumont.

VII Army Corps (General Negrier), Bologne.

13th Division.—Cantoned in the valley of the Marne
along the line Chaumont.—Saint Dizier.

14th Division.—Cantoned along the road from Chaumont
to Andelot.

Cavalry and Artillery.—Chaumont and environs.

VIII Army Corps (General Kerhué), Vauxhalles (S. W. of
Chaumont, 2 Kilometres from Montigny-sur-Aube).

15th Division, Dansevoir. { At right angles to line of
Chabillou to Chaumont,
16th Division, Vauxhalles. { 15th to the right and 16th
to the left.

The manœuvres were divided into three periods :—

1st Period. 3rd and 4th September.

Army corps against army corps.

Generals Galliffet and Davout acting as umpires.

The 5th corps on the 3rd September moved against the 6th corps, and an engagement took place north-west of Brienne on the bank of the Voire between Rosnay and Garenne. At the same time the 7th moved against the 8th towards Bricon. On the 6th September the army of the west was to concentrate near, and north of, Brienne, and the army of the east near Colombey-les-Deux-Eglises to commence the 2nd period, viz. army against army. Considering the 1st period as of secondary interest, we pass at once to the 2nd period which commenced on the 5th September.

2nd Period.

Army against army, from 5th to 7th September.

The four army corps were then coupled two a side, and Generals Galliffet and Davout each took command of two army corps. General Saussier, who is already appointed Commander-in-Chief in case of war, acted as Director-General of manœuvres.

General Idea.

“An enemy's army has penetrated into the district of Champagne, and is marching on Paris along the valley of the Marne. Two French “corps d'armée march against his left flank. The commander of the “enemy's army, being informed that strong bodies of French troops

"are menacing his left flank, detaches two army corps towards Troyes, "in order to protect himself in that direction."

General Galliffet commanded the two corps (V and VI) threatening the enemy's flank, and General Davout the two corps (VII and VIII) protecting it. To each of these two groups, constituting an army, was attached a division of cavalry. General Davout was to take the initiative. The two opposed generals were left at liberty to commence hostilities in the manner they thought best, but were to act in such a manner (whatever the result) as to enable them both to concentrate their commands at Vendeuvre on the 10th September, the place and date fixed upon for the third period: *viz.* the four army corps *versus* a skeleton enemy.

The two armies moved against each other on the afternoon of the 5th September; the eastern army from its position in front of Chaumont, and the western army from its position on the Voire in rear of Brienne. Towards evening, both armies lay between the Aube and the Blaise, the eastern force about Colombey-les-deux-Eglises, and the western force in the neighbourhood of Bar-sur-Aube.

The 5th cavalry division was to protect the taking up, by the eastern army, of the position of Colombey, considered of importance; and it was foreseen that a cavalry action would most probably take place on the extensive plateau between the forests of Dhuis and Blinfeix, wherefore General Saussier with his Chief-of-the-Staff, General Miribel, were on the spot early in the afternoon. They found General Davout, commanding the eastern army, with the 5th (General Jessé's) cavalry division judiciously posted, the divisional horse batteries so placed as to secure the important position of Colombey for the columns of the eastern army without fear of opposition.

At about 8 A. M., the main body of the enemy's cavalry (W. army), commanded by General Bonie, was signalled moving by the mill at Rizancourt towards Haricourt. In the meantime, General Negrier, commanding the VII corps, arrived at Colombey, preceded by a minute or two a company of *coureurs* of the 3rd Battalion Chasseurs, that is scouts, chosen in the battalion for their powers of "long distance" and rapid marching. This company immediately occupied the wood crowning the heights of Colombey; thus, to a certain extent, relieving General Jessé's horse artillery.

The 5th cavalry division then advanced on Argenteuil, and soon came under fire of the artillery of the 1st cavalry division posted on the plateau of Haricourt, a fire which was at once replied to by the batteries of General Jessé's division.

The artillery duel lasted over an hour, but at last, as the 1st division advanced, descending to Haricourt, it was charged by the 5th division. The shock took place near the village of Biernes on a common that seemed made for such a purpose.

Immediately afterwards, General Saussier assembled the general officers concerned, and delivered his critique. He seemed satisfied, on the whole, though he found some faults.

At about 11 A. M., the columns of infantry of the VII corps (E. army) began to debouch from the woods moving on Mothe-en-Blezy and Colombey, while, on the other side, the entire cavalry and one division of the V corps arrived at Bar-sur-Aube.

At night-fall on the 5th, the head-quarters of the western army lay at Baussancourt, the V and VI corps between Bar-sur-Aube and the forest of Blinfeix. The head-quarters of the eastern army was at Juzennecourt with the two corps lying between the forests of Dhuis and L'Etoile. The 6th September was observed as a day of rest, all troops standing fast.

On the 7th September, the eastern army advanced resolutely against the western army.

In order the more readily to appreciate the spirit of the various dispositions made by the contending forces, it is well to remember, that, according to the "General Idea", the western army represented a detachment from the great French army intended to operate against the left flank of a supposed invader marching on Paris through the Champagne district; and that the eastern army represented a portion of the invading army, detached to protect the left flank of the same, exposed to attack whilst marching towards Troyes. It is necessary, moreover, to know where the main bodies of the opposed armies were supposed to be on the 7th September, a point of no small importance in aiding us to judge, for example, on which of the two flanks of each of the forces actually engaged the greatest force should have been brought to bear. It does not, however, appear that the respective positions of the supposed main bodies were specified. In any case Troyes and Chaumont represented the two points that the opposed forces were respectively to cover.

The eastern army advanced on both sides of the road from Chaumont to Bar-sur-Aube, with the VIII corps to the left between Colombey-les-deux-Eglises and Bayel, the VII corps on the right between Colombey and Blaise. The VII corps, however, came into line nearly two hours after the VIII was already engaged.

The officer commanding had kept in reserve one regiment of the VIII corps (the 10th) and one brigade of the VII corps (Belfort brigade 35th and 42nd infantry), which troops were massed behind the heights of Colombey-les-deux-Eglises. In exchange for its brigade the VII corps received the brigade of Chasseurs.

The western army was drawn up into almost an arc of a circle round Colombey-le-Sec, with the VI corps across the road leading from Colombey through Argentolles to Rizancourt, the left resting on the woods of Blinfeix, the V corps lying between Colombey-le-Sec and the Aube. It appears that the western army had no general reserve. Their head-quarters were established at Colombey-le-Sec, with the captive balloon intended to supply information.

Fighting began at 7-30 A. M. in the direction of Bayel; but soon languished on that side; and heavy firing began between Voigny and the woods of L'Etoile, where the VII corps was posted.

The front along which the action was engaged measured 15 kilometres; and yet General Gallifet still further extended his left (VI

corps) towards the north; perhaps the better to occupy the woods and attract the enemy to that flank, thus drawing him away from the Chaumont road, on which he wanted to operate with the V corps.

Until nearly noon the artillery duel lasted, and it was only after 12 that the infantry on both sides having extended, the battle began in earnest. Both armies directed their efforts to turn the adversary's left flank;—that is the V corps attacked the VIII at Lignol and seized the village, but was checked near Villeneuve-aux-Frênes. The commander of the VII corps advanced slowly, but steadily and compactly, and occupied the plateau between Rizancourt and Haricourt without serious opposition from the VI corps, whose infantry barely commenced to show themselves on the edge of the Blinfeix woods, and then deployed his two divisions between Colombey and Buchey, and extended his right so as to envelope the left of the VI corps.

General Jamont, however, considering his position in front of Colombey-le-Sec to be very strong, massed his batteries, called up his reserve, and did not move until, being attacked by the VII corps, he launched his infantry in counter attack.

It must be noted here, that the eastern army which was originally formed up facing north-west, whether on account of the attack of the VIII corps by the V, or some other cause, had insensibly executed a change of front to the west with Colombey-les-deux-Eglises as a pivot; and at about 1-30 P. M. was disposed with the main body between Villeneuve and the plateau of Rizancourt, the wings resting on the woods of Blinfeix and those south of Villeneuve. The western army on the other hand was split into two fractions, the V corps east of Lignol preparing to attack the heights in front of Villeneuve. General Kerhué, commanding the VIII corps, had, however, made such defensive dispositions and occupied such strong positions, that the French papers held the success of General Gallaud's attack to be extremely doubtful, especially as the force that the latter disposed of was very little superior to that of the defenders.

As we have already stated, the VI corps had occupied a strong defensive position east of Colombey-le-Sec, between Ronore and Sauley, and for similar reasons the attack of the VII corps was not very likely to succeed.

At this moment, however, General Davout brought up his reserve, the 10th, 35th, and 42nd infantry, supported by two horse batteries and a few squadrons. These rapidly extended in front of Colombey-les-deux-Eglises, and advanced towards the wood in front of the farm of Cormet. At the same time the VII corps delivered an attack in force all along the line, covered by a tremendous fire of artillery.

General Jamont sent one brigade and the whole of the artillery of the Nancy division to check the central attack, and again attempted a fresh counter attack against General Negrier. The latter, however, steadily advanced, backed by some cavalry charges executed on the road leading from Buchey towards Cormet. In the meantime the V corps also furiously attacked the position occupied by the VIII corps.

At this moment the Director of manœuvres stopped all operations, and the troops took the positions previously agreed upon; viz., the western army at right angles to and on both sides of the river Aube, and the eastern army the country between Colombey-la-Fosse and the river Blaise. The cavalry of the western army bivouacked for the night near Unionville-sur-Aube, and that of the eastern army near Soulaines.

It would be out of place and very risky to attempt to criticize the operations whose characteristic phases we have attempted to delineate, because we lack all the data necessary to render such a critique serious and conscientious; yet we cannot help making a few remarks suggested by merely a cursory study of the manœuvres.

The attack made by the western (or French) army threatened much more serious results than that made by the eastern (or invading) army, because, had the former been attended with success, the principal retreat of the eastern army would have been cut off; whereas the success of the latter would merely result in the retreat of the western army on its natural base.

The forces employed became much disconnected, on both sides, and in a similar manner; so that separate and distinct engagements took place between the VI and VII, and the V and VIII corps. The somewhat disjointed action which resulted was observable most in the western army, whether from the excessive length of front taken up, or through having no reserve to fill up the gap; whereas the timely employment of the reserve made by General Davout seems to us worthy of praise. On the other hand, we think the attitude taken by the commander of the VIII corps when attacked by the V perhaps a trifle too passive, the more so that, after all, he had opposed to him a force little more than equal to his own. We repeat, however, that this is not meant as a critique, but represents merely our first impressions, and likely to be considerably modified by a more exact and detailed description of events.

*Retreat of the Western Army across the river Aube. Battle of
Vendeuvre.*

The General Idea for this second phase of the great exercise of "Army versus Army" was as follows:—

As a result of the engagement at Colombey, the western army retires across the Aube to rejoin the great army to which it belongs. The latter is marching from Vitry towards Troyes, in order to force the enemy to a general engagement near the latter town. But the western army is so closely pressed by the eastern army in its retreat on Troyes, that it is obliged to halt and again accept battle on the line Vendeuvre-Beurey.

The eastern army pursues energetically in order to force the western to halt and accept battle, and so as to prevent, or at least retard, its junction with the main army. It was also stated in the General Idea, that General Gallifet was not tied down to the defensive, although his

orders were to that effect :—it would be held sufficient if he kept the Vendevre-Troyes road so thoroughly open, as to secure his retreat and junction with his main body.

The passage of the Aube was effected between Dolancourt and Bayel, by taking advantage of all existing bridges, and by a pontoon bridge thrown across the river by the Pontoon Train of the V Corps between Bar-sur-Aube and Fontaine—1 kilometre S. E. of Bar-sur-Aube.

The baggage, military train, etc., moved from Bar-sur-Aube at 5 A.M. on the 8th September, and crossed over by the town bridges, and by the aforementioned pontoon bridge. The V Corps crossed over near Bayel, covered by the 46th Infantry, posted in the woods of Côte-aux-Anges, and by the artillery of the 10th Division. The VI Corps crossed by the bridges W. of Bar-sur-Aube.

At noon, the western army was all on the left bank of the river, and except at Bayel, where the rear guard of the V Corps was attacked by the advanced guard of the VIII Corps, the crossing was effected without serious opposition. This attitude of the eastern (or invading) army, in real warfare, and under the circumstances assumed in the General Idea, would be deserving of the severest censure; but it may be that it was prescribed by the Director of Manœuvres for reasons unknown to us, and those not of a military character.

On the afternoon of the 8th the captive balloon was transferred from the western to the eastern army.

It was affirmed by the French newspapers that the Director of Manœuvres had left the commanders of armies great freedom of action, in order to allow them to develop their tactical powers; but we do not see how—given this great freedom of action—it came to be known on the evening of the 8th, and published in the papers, what dispositions would be made on the morrow by the eastern army, down to the very troops composing the reserve etc., and giving their exact positions. If the French papers were enabled to publish all this on the evening of the 8th September, it stands to reason that the commander of the western army must have known something too, and that, in all probability, the issues were pre-arranged—however, to continue. The following was the distribution of the two armies on the evening of the 8th September.

Western army.—On the line Vendevre-Beurey-Chervey (13 kilometres) with head-quarters at Thieffrain, the V Corps on the right and VI Corps on the left.

The 1st cavalry division towards Lusigny—15 kilometres in rear of Vendevre.

Eastern army.—Right bank of the Laudion, which flows from south to north and into the Aube at Dolancourt. Head-quarters at Bligny. The VII Corps between Bar-sur-Aube, Dolancourt, and the Laudion. The VIII Corps more to the south as far as the Arce. The 5th cavalry division on the left bank of the Laudion near Mierville.

The western army was enabled to push forward its outposts as far as Magny Fouchard, Nuisement, Les Puits, and Longre; and the VI Corps advanced posts entrenched themselves around Nuisement.

The War Minister, M. Freycinet, was present at the operations on the 9th. He arrived at Vendevre station at 8-30, when the action had

already commenced. The foreign officers, accompanied by a chef d'escadron and by Lieutenant Carnot (son of the President of the Republic), did not move from Vendevre Station till 9 A. M. It was evidently intended that they should not witness the really important part of the manœuvres, viz. the preparatory dispositions, but should witness only the final spectacular display. The same plan was followed at last year's manœuvres. The fighting began at about 8 A. M. It was the VII Corps vigorously attacking the entrenched lines at Nuisement. General Negrier had debouched from Magny Fouchard and from Maisons-des-champs, crossed the old Troyes—Bar-sur-Aube road, and surrounded Nuisement. The left of the VII Corps extended as far as Montmartin. In the meantime, the VIII Corps began to defile out of the woods of Bassicand south of Montmartin. The captive balloon rose in the neighbourhood of Montmartin in the zone of action of the VIII Corps, and here was also the head-quarters of the eastern army.

On the side of the western army, the bulk of the VI Corps was between Puits, Vendevre, and the farms of Saint Gabriel and de la Forêt. The V Corps was concentrated about Beurey in defensive position, with the 2nd Division and the corps artillery left of the village, and the 9th division on the right (south) disposed in echelon of brigades with the divisional artillery and the corps cavalry brigade in its rear. General Bonie's cavalry division was posted on the heights of Granges-aux-Bois.

Up to about 11 A. M. the action was mainly confined to the plateau of Montmartin and in front of Nuisement, where the outposts of the VI Corps had been reinforced. Two villages and the road had been effectively strengthened with entrenchments and batteries. At last, about 11 A. M. the VII Corps captured Nuisement, and the defenders retired on Vendevre, then halted, and took up a fresh position 1 kilometre in rear of Nuisement.

Having seized Nuisement, General Negrier prepared to move resolutely to the attack of Vendevre, by massing all his corps artillery within easy range of the town, and calling upon the VIII Corps to second the operation.

Meanwhile General Galliffet, who had advanced with the whole of General Voisin's division and the Marine Infantry brigade towards Nuisement, retired slowly with these troops upon the principal position of Beurey-Vendevre.

General Jamont, seeing Vendevre menaced, reinforced the troops occupying it by the whole of General Jollivet's brigade, and at the same time General Galliffet ordered the rear brigade of the 9th division (extreme right of the army) to move towards the centre.

At noon, the artillery of the VII Corps bombarded Vendevre, and, at the same time their infantry debouched from Magny Fouchard, and skirting the edge of the Grand Orient woods, and skilfully taking advantage of the cover afforded by the undulating nature of the ground, turned the flank of the troops posted on this side with one flank resting on the Crébenard rivulet, and the other on the Paris-Mulhouse road, and already exposed to many fires. Hard pressed in front, with their left flank

turned and exposed to artillery fire, the troops in front of Vendevre were obliged to retire towards the town.

At about 1 p. m. the VIII Corps too emerged from the Bossicand Woods, deployed between Longprey and the farm of Granges-aux-bois, moved on Beurey, and entered into action. General Kerhué endeavoured to gain ground so as to surround the heights and village of Beurey in the direction of Magnant, on seeing which General Gallifet deployed the V Corps and received the columns of the VIII with a hot artillery fire.

All the corps artillery of the VI, which was rapidly posted on the Beurey heights, was brought to bear on the columns of the VIII Corps almost in flank. Briefly, under these circumstances, the attack of the latter was not likely to be attended with success.

The position between 1 and 2 p. m. may be summed up as follows:—On the right of the eastern army, the spirited turning attack executed by General Negrier had driven the adversary from his advanced positions; and now the success of this attack depended on the degree of resistance of which the troops occupying Vendevre were still capable. On the left, the attack of the VIII Corps had failed; and the V Corps (W. army), supported by the artillery of the VI, was presumably about to execute an energetic counter attack towards Longprey. A great gap had been formed between the VII and VIII Corps.

Precisely at this moment, General Saussier stopped all operations.

As regards the employment of the cavalry, it would seem that it left much to be desired, especially in the eastern army, in which the 1st cavalry division and the cavalry brigade of the VII Corps had been concentrated towards Jessains; but this mass of squadrons co-operated but feebly and with only a part of their force in the attack of Vendevre. At least it is so stated in the French newspapers.

That evening the western army lay south of the Grand Orient Woods from Magny Fouchard to Bar-sur-Seine;—and the eastern army from Spoy on the upper course of the Lau lion as far as Merrey not far from Bar-sur-Aube.

With the battle of Vendevre ended the 2nd period of the manœuvres, *viz.* army versus army, and on the 10th the 3rd period, *viz.* group of armies *versus* skeleton enemy began. * * *

And here, as in the case of the engagement at Colombey-les-deux-Eglises, the data given us are too uncertain, vague, and imperfect to justify a conscientious critique. One might remark on the too extended fronts taken up, and on the fact that the commander of the western army, by reinforcing his advanced position, perhaps weakened his resistance at the key of the position. Exception might also be taken to the fact that General Jamont's left allowed itself to be taken by surprise, and that a broad gap was allowed to occur between the VII and VIII Corps; but we repeat that with the meagre observations allowed us, it would be imprudent to deliver a decisive opinion.

We think it, however, expedient to fix our attention on a fact that might offer arguments for useful discussion. The battle resolved itself most on the two flanks, evidently in consequence of the original plans of the two commanders. Both General Gallifet and General Davout

seemed to aim at the strategic flank of the adversary, which was evidently the left. Near Vendevre, the western army, if beaten, would have been cut off from Troyes; whilst, on the other hand, a march of the V Corps from Beurey towards Bar-sur-Aube, while the eastern army was irretrievably engaged near Vendevre, might seriously compromise its retreat on Chaumont.

The same strategic plan was, however, carried out in a very different manner by the two commanders. General Davout moved forward energetically with his right wing and attacked without delay; whereas General Galliffet seems to have waited, not only for the enemy's right to become fully engaged near Vendevre before advancing with his left towards Longprey, but also for the VIII Corps to develop its attack against his strong position so as to check it, counter attack, and having defeated the VIII Corps, to march towards the Aube.

Which of the two procedures was to be preferred? It is difficult to give a decisive reply, because the general respective position of the two armies, the orders received by their commanders, and the nature of the ground, must be taken into consideration, but there certainly seems to be no doubt that it was, to say the least, convenient for the western army to let the VII Corps become seriously engaged near Vendevre before making the move with its right against Longprey. Not everyone, on the other hand, will be of opinion that General Galliffet acted right in awaiting the attack of the VIII Corps, in order to repulse it and then move forward. Had the VIII contented itself with strongly occupying the edge of the Bossicand Woods, and making feints towards Beurey, might not the VII Corps have captured Vendevre before General Gallaud (V Corps) could come to conclusions with General Kerhué (VIII corps)?

Again we naturally remark upon the fact, that in this action as well as at Colombey, the different army corps fought against each other, that is to say neither side had concentrated such force on the decisive point as to render success at least probable.

Group of armies versus Skeleton enemy.

On the 10th September the armies of Generals Galliffet and Davout were united, and General Saussier assumed the supreme command.

The Brigade of Chasseurs, the Marine Infantry brigade, three regiments of cavalry, six horse batteries and three field batteries, under the command of General Boisdeffre, under-chief * of the staff of the army, were concentrated on the evening of the 9th, and on the 10th marched from the Aube towards the Marne to constitute the skeleton enemy.

On the 10th itself, however, General Saussier was supposed to have received news that considerable forces of the enemy had been seen in the direction of Vitry-Chalons, as well as at Bar-le-duc-Revinny; but more particularly in the latter neighbourhood; and he threw out the 1st and 5th divisions of cavalry under General Bonie, to reconnoitre in

* Sous-Chef d'Etat-Major.

the tract of country comprised between Joinville, Vitry, and Sommesous. On the following day (the 11th) began the forward march of the two armies, united between the Seine and the Aube, towards the river Marne.

Operations between the 10th and 12th September.

On the evening of the 10th the two armies under the command of General Saussier were disposed as follow :—

GENERAL ARMY HEAD-QUARTERS, VENDEUVRE.

WESTERN ARMY, HEAD-QUARTERS, THIEFFRAIN.

Zone of the V Corps.—Bar-sur-Seine, Bourguignons, Poligny, Marolles, Briel, Villy-en-Trodes, Magnan; 5th cavalry brigade at Montieramey.

Zone of the VI Corps.—Thieffrain, Mesnil St. Pierre, Magny-Fouchard and Les Puits.

EASTERN ARMY, Head-Quarters, Bligny.

Zone of the VII Corps.—Bligny, Vitry-le-Croisé, Egnilly, Bertignolle, Beurey, Longprey, Montmartin, Spoix, Meurville, and Couvignon.

Zone of the VIII Corps.—Merry, Buxières, Chervey, Ville-sur-Arce, Viviers, Laudreville; 8th cavalry brigade at Essoyes.

As we have already stated, the enemy was signalled simultaneously at Bar-le-duc-Reigny, and at Vitry-Chalons; but as it seems he was in greater strength at the former place, General Saussier directed the advance of his forces in that direction. Owing to the uncertainty of the situation, however, he determined to adopt on the march such a formation, as would enable him on emergency to change front also towards Vitry. He therefore made the following dispositions. The western army formed the left column and the eastern army the right column. Each army followed a group of roads, which enabled it to march in lines of columns of divisions, army corps following army corps, the VI and VII corps leading. The result was a march in square. The four brigades of corps cavalry protected the front and flanks. The two cavalry divisions, as we have seen, were pushed forward to feel for the enemy.

On the 11th, the army was to cross the Aube and attain the line of Soulaines-Beurville, and the several columns received the following routes.

Eastern Army.

Right Column.—Viviers, Egnilly, Meurville, Bar-sur-Aube, Arrentières, Maisons.

Left Column.—Buxières, Longprey, Montmartin, Magny Fouchard, Dolancourt, Levigny, Thil.

Western Army.

Right Column.—Magnant, Beurey, Magny Fouchard, Jessains, Fuligny, Soulaines.

Left Column.—Vendeuvre, Unionville, La Rothière, Chaumesnil, Morvilliers, Juzanvigny, Epothément.

We have said that on each road marched one division of each army corps. To be more precise, we must add that following each division

and on the inner road came the baggage and trains, and on the outer roads the corps artillery and the bulk of the corps cavalry. A halt was called when the two army corps in the first line had entirely crossed the Aube.

Judging from the French newspapers, this march in square was executed with great facility and noteworthy precision. The arrangements made by staff officers, and the vigour and marching power of the troops are much praised. Exception is made in the latter particular of the Marine Infantry, who were not, on the whole, very satisfactory as regards marching from want of practice.

On the evening of the 11th, the following was the distribution.

ARMY HEAD-QUARTERS, VENDEUVRE.

WESTERN ARMY, HEAD-QUARTERS, BAUSSANCOURT.

Zone of the V Corps.—Unionville, Jessains, Baussancourt, Eclance, Vernonvilliers, Le Petit Mesnil, Chaumesnil, La Rothière. Cavalry brigade at Brienne.

Zone of the VI Corps.—1st Line, Juzanvigny, Crespy, Morvilliers, La Ville au Bois, Epothémont. 2nd Line, La Choise, Soulaines, Fuli-gny. Cavalry brigade at Longeville.

EASTERN ARMY, HEAD-QUARTERS, BAR-SUR-AUBE.

Zone of the VII Corps.—Tremilly, Ville-sur-Terre, Fresney, Maisons, Sauley, Thors, Beurville, Villiers-aux-Chênes, Blumery, Nully. Cavalry brigade at Rozières.

Zone of the VIII Corps.—Bar-sur-Aube, Voigny, Colombey-le-Sec, Colombey-la-Fosse, Eugent, Levigny, Arsonval, Jancourt. Cavalry brigade at Rizancourt.

On the evening of the 11th, the Commander-in-Chief received reports from the reconnoitring cavalry to the effect that the enemy, instead of massing at Bar-le-Duc, was, on the contrary, in strength at Vitry-le-François; wherefore he arranged that on the 12th, both armies should cross the Voire, executing a great change of front to the left. We will hereafter describe this movement and the engagements that resulted therefrom; but, in the meantime, we think it expedient to make a few remarks on the operations of the 11th September. On the evening of the 10th, the two armies had their front between Vendevre and Couvignon (about 14 kilometres), and their rear reached the river Seine; so that the depth of the eastern army amounted to 25 kilometres, and that of the western army to 20 kilometres.

On the 11th they moved from the front Vendevre-Couvignon to the line Epothémont-Blumery, which is, as the crow-flies, almost 24 kilometres. The rear of the two armies was nearly all on the right bank of the Aube, and therefore the rear-guards must have marched between 22 and 28 kilometres. On the evening of the 11th the 120,000 men under General Sausnier's command were formed into a gigantic square, of which the sides were about 20 kilometres long. It was a strategic operation of great magnitude, and it is just to recognize the fact that the troops evinced great power of endurance in long marches,

and the staff of the army had most skilfully arranged all the details pertaining to the movement of very large units.

The formation selected for the march by the Commander-in-Chief seems to us excellent, and well suited to the strategic requirements of the moment, as it admitted (as in fact happened on the 12th) of a prompt change of front towards north or south. By taking advantage of intermediate roads, there were in fact eight divisions marching in an almost independent manner; whereby all the confusion and straggling of the ordinary march of an army corps, when divisions succeed each other at a short distance, was avoided.

This marching in square, when the roads allow of it, and when the same formation is maintained in camp with more or less the same distances or depth, gives to a remarkable extent great mobility and facility for manœuvring to even the greatest masses of troops. These four army corps would have been in a position to enter into action in whatever direction the enemy had made his appearance, and would have done so in good time.

At first sight, it would appear that, given four parallel roads, the object in view could have been gained equally well, by assigning one road to each army corps; but although action to the front could, in this way, have been secured just as easily, yet, when it became necessary to change front in order to move to the right or left, such movement would have either entailed the mixing up of the divisions of different corps, or a whole day, at least, would have to be lost in preparatory movements. In fact, having one army corps following the other in lines of columns of divisions, all that is necessary is for each division to change front to the right or left; whereas with four army corps marching abreast, more extended movements are necessary. On the other hand, the march in square, as executed by General Saussier, would present no small difficulties to the corps in front, were the advance to continue for several consecutive days, and if supplies and ammunition were to come from the rear. It would be interesting to know, in this connection, what arrangements had been made, and orders given, with regard to the employment of railways, especially of the two lines Chaumont-Brienne and Troyes-Brienne.

On the evening of the 11th then, the line of front of the army was roughly indicated by the road from Epothémont through Soullaines to Blumery; and the rear extended to the valley of the Aube between Unionville and Bar-sur-Aube.

In consequence of reports received from the cavalry, of the concentration of large masses of the enemy's troops between Vitry-le-François and Sommesous, the Commander-in-Chief arranged that the two armies should, on the following day, change front almost at right angles, and march towards the Voire, so as to arrive at the river in the evening, with the V, VI, and VII corps in the first line, and the VIII in reserve in rear of the woods of Soullaines towards Epothémont and Louzé.

The cavalry was ordered to retard as much as possible the enemy's advance on Brienne, with a view to protect the movement of the columns

through the region comprised within the triangle formed by Chantecoq, Chavanges, and Montierender, a country much wooded and enclosed, and intersected with water courses and ditches. After this the cavalry was to be disposed on both wings of the great army with the 5th division at Montierender and the first at Piney, from which moment they would again be under the command and at the disposal of commanders of armies.

Among the subsidiary operations which General Saussier introduced into the programme of the manœuvres, one of the most interesting was the re-construction of a railway bridge supposed to have been destroyed by the enemy, a work which involved the re-laying of the permanent way on both sides of the bridge. Notwithstanding many difficulties, especially of an administrative nature, General Saussier, by enlisting the help of the directors of the *Compagnie des Chemins-de-fer de l'Est*, had the bridge re-constructed. It was the bridge across the Amance, about one kilometre from Brienne, near the Mathaux station. The bulk of water is of no importance, but the banks are high and sloping, necessitating a bridge 45 metres long. After a preliminary examination Captain d'Anteville declared four days necessary (or more exactly 72 hours of work for the girder work, and 29 hours to launch the bridge), besides which 24 hours were requisite for levelling &c.; but this work could be done simultaneously with the actual construction of the bridge, by working at night by means of incandescent lights of the Velts system, and with considerable numbers of extra workmen. General Saussier, however, preferred to lengthen the time and diminish the number of workmen required; and instead of four days, seven days were employed in its construction. It is of the special type proposed by Colonel Marcille, the composing parts were prepared in the workshops of the station "Des Matelots" at Versailles, and arrived on the spot at 4 P. M. on the 8th. On the 13th, a special train with a load of 80 tons was to have left Brienne to pass over the new bridge on its way to Troyes.

We are not, at least for the present, in a position to give any details regarding the change of front of the 12th September. We can only say that the march was very regularly executed, and without any hitch worthy of notice. It seems, however, that the cavalry was given very heavy work to do during these manœuvres and that it suffered considerably. According to the "France Militaire," the 1st cavalry division suffered serious loss in horses, and would require several months to recoup itself and be in a state of efficiency to enter upon a campaign.

On the evening of the 12th September the following was, roughly, the distribution :—

V Corps near the confluence of the Voire and the Aube, and across both streams. VI and VII Corps along the line of the Voire as far as the Brevonne, and the VIII Corps in echelon, left in front, between Soulaines and Epothémont. A large proportion of the troops bivouacked, and outposts were ordered during the whole night, as the army was now in contact with the enemy.

During the night of the 12th and 13th, an interesting exercise took place, under the following general idea :—The enemy (a skeleton

force) strongly occupies and crowns with his batteries the heights on the right bank of the Voire. It is determined to dislodge him, at least from his advanced positions, by means of a night attack in force.

The V corps moved first. The 9th Division advanced from Pongysur-Aube towards the village of Magnicourt, charged with the bayonet, and seized the village; meanwhile the riflemen of the VI corps made a feint on the farm of Garenne, making as if to ford the river. The VII corps made for the bridge at Bettignicourt, and although General Boisdeffre's position was here very strong, since his retreat had been previously agreed upon, he retired towards the north, evacuating Rosnay. At about 6 A. M., the exercise ceased.

The 13th was observed as a day of rest, and on the 14th General Saussier's army resumed its march to the north. Regarding the operations of the 12th and 13th September, we quite agree with the "France Militaire," that is, that although they enabled the troops to give practical proof of their high state of efficiency and of their great marching powers, and the departments, especially the General Staff, to derive much benefit from the instructions received, yet the several commanders would have profited much more had they not previously known, from beginning to end, every single detail of the programme of manœuvres, and therefore been perfectly aware of the fact, that after the march of the 11th, there would be a change of front to the north under circumstances and with details thoroughly mastered a long time before.

As we have already observed, the great march "in square" on the 11th was well planned and well executed. It seems also that the manœuvres on the 12th were well carried out; but although all this may be useful as a preparation for more serious work, we really cannot agree with the French, who, for this alone, praise their generals up to the skies, and would almost place their Miribel one step higher than von Moltke, if not above Napoleon himself.

* * *

III PERIOD.

Operations from the 14th to the 16th September.

During the night attack of the 13th September, the left of General Saussier's army had succeeded in turning the right flank of the (skeleton) enemy. General Boisdeffre had therefore thought fit to abandon the entire line of the Voire, and to fall back on a defensive position half way between Vitry and Brienne, with his right on the little brook of Puits and his left on the wooded lake district of Chantecoq. The defensive line of the skeleton enemy was in the general direction of Brébant, Corbeil, Margerie, and Arrembecourt, and the key of the position was the village and adjacent heights of Margerie-Haucourt, which completely command the high road to Vitry. General Boisdeffre strengthened this point with entrenchments and earth batteries, and posted a strong force therein, with his principal reserve at Lignol within easy reach.

General Saussier's group of armies advanced from the Voire towards Vitry with the V, VI, and VII corps in the first line and the VIII corps in the second line, the two divisions of cavalry being on the extreme left.

The following objectives were assigned to the different corps:—The V from Magnicourt and Chalette on Corbeil, the VI from Bettignicourt and Romay on St. Léger, and the VII from Courcelles by Chassericourt on Margerie. The VIII corps from Epothémont was to move to the left so as to strike the road to Vitry.

It appears that the V corps and the cavalry were instructed to cut off the enemy from Vitry and force him to move eastward.

It was not till 8-30 A. M. that the troops became seriously engaged. At 9, the crests of the heights to the right and left of Margerie were already crowned with the troops of the VI and VII corps. Colonel Niox, with his *Chasseurs-à-pied* (skeleton enemy), attempted a vigorous counter attack against the skirmishers of the VII corps; but just at this moment the troops of the V and VI corps appeared on the right of St. Léger and further west as far as Corbeil. The Chasseurs were repulsed, and Colonel Niox rallied them down in the valley of the brook, des Muraux, where, supported by the second line of defence and by the artillery, they continued to offer a stubborn resistance.

At 11 A. M., the situation on the field of battle was, as nearly as possible, the following:—On the right, the VII corps was descending the slopes of Chassericourt towards the Marais rivulet, still obstinately defended by Colonel Niox. The VI corps was deploying in the direction of St. Léger. The V corps was in the wood of Petronettes moving to the attack of Corbeil. The cavalry held aloof moving on Hambanville. Around the farms of Morroy Charbotell and Des Chênes, and more especially around Margerie, the skeleton enemy continued to resist. Margerie was, as we have said, the principal objective, and against it were directed the greatest efforts of the VI, VII, and VIII corps; but before the action had sufficiently developed itself to justify a decision as to whether this important point had or had not been carried, General Saussier caused the signal to be sounded for the cessation of operations.

General Boisdeffre, concluding that General Saussier had been adjudged the winner, decided to at once place the Marne between himself and the enemy; but owing to the advantages gained by the V corps and the cavalry on his extreme right, he was obliged to abandon the Vitry road and to move eastward, so as to cross the Marne between Frignicourt and Moëlain (near Laricourt) by the existing bridge, and by others which he reckoned on constructing with the *matériel* at his disposal.

On the 15th, he continued his retreat, crossed the Marne, and by evening his rear-guard was clear of St. Remy. This retreat was covered by troops which still continued to defend the Laricourt bridge and the military bridges beyond it, although, by this time, it was well known that the programme of the Grand Manœuvres was exhausted, and that General Saussier would not, therefore, press the pursuit.

The retreat of the enemy across the Marne marked the end of the manœuvres. On the evening of the 15th, General Saussier's group of armies lay between Vitry, Blesme, Laricourt, and St. Remy, and General Boisdeffre's troops at Perthes. All encamped on good and extensive

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(b).....

(c).....

(d).....

(e).....

1st Batt^y

2nd Batt^y

3rd Batt^y

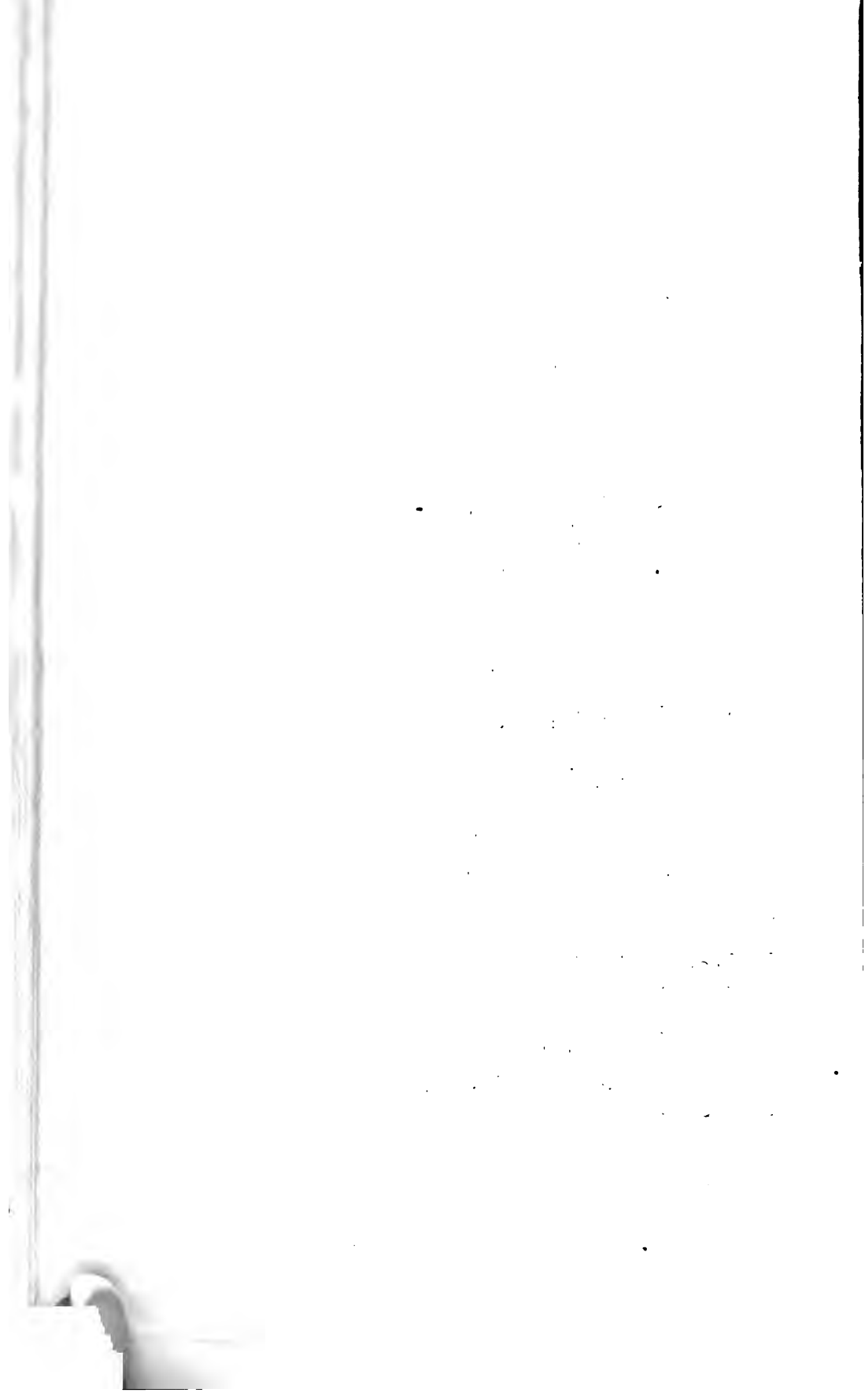
(g)

1st Regt

2nd Regt

3rd Regt

4th Regt



ground previously selected for the purpose, and which the troops were to continue to occupy until de-mobilized.

The 16th September was observed as a day of rest, and the troops prepared for the great review which took place on the 17th September.

The final review and march-past.

On the 17th September a great review of the troops took place in the presence of the President of the Republic, accompanied by the President of the Council, and the War Minister M. de Freycinet.

The troops were drawn up facing N. W. in a line extending from Matignicourt to Montcets, and formed into seven masses of columns; viz, the four army corps, the two divisions of unattached cavalry, and the column of troops forming the skeleton enemy. Engineer corps without wagons, and artillery with only guns and limbers.

Each "mass" was disposed according to the regulations for reviews, but with somewhat larger intervals (each army corps having a front of 500 metres), and at a convenient distance from the alignment on which they were subsequently to deploy into lines of columns, advance to the line of flags, and take up their intervals and dressing by the right.

By 8-30 A. M. all troops were at their posts. At 9 the President arrived, and General Saussier received him with a salute. He then rode down the front, and went to the grand stand prepared for him, and the march-past began.

First came the two divisions of cavalry with their horse artillery, going past at the trot by brigades, regiments in column of squadrons in the following order:—1st, Chasseurs-à-cheval, 2nd, Dragoons, 3rd, Horse Artillery, 4th, Cuirassiers.

The four Corps d' Armée followed, each in the following order,—1, first division, 2, second division, 3, corps and divisional artillery, 4, corps brigades of cavalry, 5, ambulance corps, 6, telegraph sections, 7, treasure chests and post office. The Bands, Pioneers, Buglers and Drummers of the 12 battalions of each division were in front, the Bands playing during the march of the whole division, those of each second division continuing to play during the march of the unattached army corps troops. In front of each first division of each corps marched the divisional company of Engineers and the corps battalion of Chasseurs-à-pied or riflemen. Then followed the four regiments composing each infantry division in the formation shewn in the accompanying sketch.

(a) Two Brigadier-Generals with their staff. (b) Four Colonels of regiments. (c) Sixteen Lieut.-Colonels and Majors commanding battalions. (d) Twelve Adjutants-Major, and four regimental colours. (e) Forty-eight company commanders. (f) Four regiments in line of masses of columns of battalions, each battalion in double column of half-companies. (g) Twelve medical officers. The corps and divisional artillery went past with each group in line at close intervals.

After the march-past of the army corps, the cavalry divisions, together with the brigades of corps cavalry (20 regiments of 4 squadrons each, and six batteries of horse artillery), advanced at the galop towards

the grand stands. They were formed up for this purpose 400 metres from and facing the grand stands, in line of regiments in columns of squadrons, horse artillery in rear; and they charged up to 100 metres from the stands.

The whole display succeeded admirably and was witnessed by about 150,000 people, who applauded the brave show with frantic cheers and enthusiastic clapping of hands.

Notes on the effects of smokeless powder at the French Manœuvres.

After an attentive study of the observations made by various competent persons at the manœuvres in the Champagne district upon this important subject, we come to the following conclusions.

The absence of smoke makes it extremely difficult to follow the progress of an action; but as regards artillery it is still possible, with a little care, to distinguish where the various batteries are posted, because the *flash* of the discharge is very vivid and can be seen at a great distance.

Although infantry, when firing, are well concealed, yet, when in motion, they can be seen much more plainly than was the case formerly.

The absence of smoke has one great advantage for the artillery; they can fire much more rapidly, as the mark is no longer obscured by their own smoke.

It has been observed that infantry volleys almost entirely escape the notice of anyone standing at a distance from the troops firing them, unless the weather is dry and the men are firing in the kneeling or lying-down position, behind a dusty road, or in a field lying fallow. In this case a cloud of dust is raised, which is very visible and apt to betray the presence of troops. Hence it follows that when firing volleys preference should be given, if possible, to grassy plains or cultivated fields, unless the weather is damp or rainy, when such precautions are, of course, unnecessary. This applies also and more particularly to artillery, whose fire at the battle of Vendœuvre, for instance, raised thick clouds of dust where batteries were posted in rear of dry ground or fallow fields, while those posted in cultivation or grass commons only betrayed their presence by their flash.

The moment an engagement has been seriously commenced, however, it might almost be said that the absence of smoke loses its characteristic of not betraying the presence of troops; but it still preserves the advantage of not veiling the objects aimed at, and therefore admits of rapid firing both by artillery and infantry.

As regards the general control of operations, it may be remarked that commanders of large units at a considerable distance in rear of the fighting line, experience greater difficulty than formerly in following the progress of the action; hence they are under the necessity of continually despatching staff officers to various parts of the line, in order to be kept informed of what is going on in front. To compensate them for this, however, they have the advantage of being better able to descry the movements of the enemy's reserves.

General instructions by General Saussier published previous to the commencement of the manœuvres.

We give here, briefly, some preliminary orders issued by General Saussier for the better conduct of the manœuvres:

Among orders relative to discipline, the following is worthy of notice. "Soldiers must not forget that, by respecting their superiors, they respect themselves; because the honour with which they surround their officers, is the best means of increasing military *prestige* in the eyes of the people."

On the subject of camp duties, he particularly ordered that there should be no noise in camp at dawn, as, for instance, when cooks and orderlies are roused, as it is absolutely necessary that troops about to be called upon to undergo fatiguing duties should be able to sleep up to the very last moment before *reveillée*. This is a truly excellent order which we would wish to see adopted in our own service.

As regards victualling during the manœuvres, it was laid down as a general rule that the regulations as for active service were to be adhered to; but a certain amount of latitude was allowed to army corps commanders to make such additions or alterations, from time to time, as they thought necessary. Commissariat meat-carts were permitted to follow corps constantly; but canteen-carts were to remain in camp, and were not to be seen about during an engagement.

As for the orders relative to the execution of the manœuvres and for the guidance of umpires, among them are instructions for cavalry charges against infantry which are deserving of particular attention. Cavalry, when charging infantry, were allowed to *charge through them*, if it could be done without danger, otherwise they were to disperse to the right and left; but in no case were they to remain halted under infantry fire, not even while awaiting the decision of umpires.

We think that order also excellent, which prescribed to general officers commanding army corps and divisions, whenever they undertook any operation, to explain to officers of all ranks and of all arms under their command, the object of the operation, the part to be played by the whole column, and by every single detachment of it. And not only officers, but non-commissioned officers and soldiers also were to be informed, very briefly of course, what the general situation was, and what was about to be undertaken.

During the manœuvres, out-posts were always to be thrown out, but the actual duties might be suspended between 9 P. M. and 4 A. M. (although the men were to remain on the spot), so as to allow of a sufficient margin of time for surprises, to which it is desirable that troops should get accustomed, and at the same time to give the men a good number of hours' rest.

The new armament of infantry does not allow of cavalry, when unsupported, carrying out the reconnaissance which precedes the tactical employment of the three arms, hence the necessity for special reconnoitring patrols drawn from infantry corps and composed of picked men expressly trained to the work. As there are at present no definite rules for the employment of such patrols, the commanders of army

corps were left at liberty to exercise their own judgment in organizing and controlling this important service.

The absence of smoke and the diminished report of the new fire-arms have made the conduct of troops, when extended, more difficult. Moreover, the destructive effects of which the arms are capable will frequently, especially in the attack, necessitate redoubled efforts on the part of the fighting line. Hence, a double reason for adopting a closer front. A battalion of 720 men (such being the strength of battalions at the manœuvres) should never exceed a front of 300 metres, except under special circumstances.

The employment of the third line is considered best calculated to ensure the success of an attack. It is recommended that an attack should not be commenced too far from the objective, as this would incapacitate the men for the efforts demanded of them, which shows that the opinion of those who hold that smokeless powder has precluded the commencement of attacks at 500 or 600 metres from the position is not shared in official circles in France. It is also recommended that the position from which to commence an attack be taken up during the night preceding the intended operation, so as to execute it under the most favourable circumstances.

Finally, General Saussier made a warm appeal to the patriotism of all ranks, and recommended good fellowship and mutual help between the various arms, so that the manœuvres might offer to all an example of union towards the accomplishment of a common object.

THE VELOCIPEDE IN MILITARY SERVICE.

Translated from the German,

By Captain A. BEALE, 5th Bombay Light Infantry.

The notable success which the English troops in Africa achieved before all other armies in the rapid and direct conveyance of reports and orders by the employment of the velocipede led the German military authorities to make this vehicle, the build of which had been brought to considerable perfection during the previous ten years, serve military purposes as early as the year 1885. As a result velocipedes were used on the occasion of the autumn manœuvres first by the sixth army corps for the conveyance of military orders etc., and the reservists, former non-commissioned officers or short term men, who were employed as road orderlies, obtained the best results, so that the new institution, having proved a success, has been preserved through subsequent years.

Corresponding to the proceeding of the German military authorities the French ministry of war took up the question in the year 1887. In the third region of the territorial army those of all grades of the called up infantry reserves who showed themselves practised bicyclists or desirous of being employed as road orderlies during their training, were mustered separately, and subjected to special examination including military proficiency. The approved candidates brought their own machines and received an extra daily allowance of 50 centimes during their presence with the colours. Their equipment was of the ordinary military pattern with the army revolver. Pending further orders they were allowed to wear nether garments of any colour, and leggings of leather or cloth, or long stockings, with shoes of any pattern. As regards the description of machine, the "bicyclette" was declared to be the best, but velocipedes of different kinds might be used.

In the autumn of 1888 a trial of speed was made at Tours between the different means of conveying despatches. The object was to deliver written communications at Montbazou, a distance of 4,300 metres. The several competitors were: 8 troopers, viz. 4 dragoons of the 25th Regiment and 4 hussars of the 7th Regiment; 4 cyclists, viz. 2 tricycles, 1 bicycle, and 1 bicyclette; 2 dogs called Brisefer and Turco; some carrier pigeons of the Colombophile Society of Tours. The dog Turco was despatched first; his fourfooted comrade Brisefer followed 30 seconds later; after the lapse of another half minute the troopers moved off, then the cyclists, and last of all the carrier pigeons.

The following is the order of speed: 1st, the pigeons, 5 min. 35 sec. 2nd, the bicyclette, 7 min. 35 sec. 3rd, the troopers, 8 min. 4th, the dogs, Brisefer 8 min. 8 sec., and Turco 8 min. 35 sec. 5th, the bicycle, 9 min. 15 sec. 6th, the tricycles, one 10 min. 30 sec., the other 10 min. 40 sec.

THE WAR DOGS OF THE GERMAN EMPIRE.

By the same translator.

Those who have lived on the frontier, especially in countries where the natural features of the ground favour smuggling, may have observed a quite peculiar and remarkable development of the intelligence of the domestic animal who is rightly described as the most faithful friend of the human being.

If the help of a highly gifted and well trained dog is indispensable to the sportsman, game-keeper, and exsiccator, how much more important is the same for the smuggler, whose fortune, freedom, and life itself depend on the sagacious and timely assistance of his dog. As an example of the astounding intelligence and cunning training of such dogs, I give one of my experiences in the provinces of Posen.

Only one narrow wooden bridge led over the deep and broad trench that marked the frontier for a long distance. It was also only at this bridge that there was good cover, so goods had to be smuggled across at this point, which did not fail to receive a daily visit from the frontier guards. It was always a pleasure to me to observe the proceedings of the smugglers with their little hairy dog. I would see them approach the bridge heavily laden, and take cover until the two guards arrived with their handsome stately pointers. These would have of course discovered the presence of the smugglers, but while they were still some 60 paces off the bridge a little barker would jump up out the trench at a distance of about 200 paces, and give tongue lustily. During the hot chase which ensued, the smugglers would cross over the bridge and slip away in the opposite direction.

Every such highly gifted and well trained dog is faithful and incorruptible, all attachment and obedience to his master, but hostile and snappish to every stranger, so that no one dare take hold of him; and above all he is accustomed not to take even the most tempting morsel from a strange hand. But the best dog is never entirely reliable in one very important respect. He allows himself to be led away and unsettled by a strange dog. Of whatever sex, they will go after a strange dog, whether only to smell, or to worry and fight, or from sexual instinct. Here Samson can never resist Delilah.

So it happened to the small hairy, otherwise so prudent, dog of the smugglers. One day the frontier guards brought a newly acquired pointer bitch. The smugglers' dog was irresistibly attracted by her to his own and his master's destruction.

In the German army trials have been made with all kinds of breeds, with the result, that as is the case with carrier pigeons, a series of interbreeding produces the most useful animal. A mongrel with a preponderance of colley and terrier would appear to be best suited for military purposes, courageous and enterprising, though at the same time cautious and cunning.

In the same way as the carrier pigeon, the dog is intended to render service in war in cases where all other means fail, or where he can be

more profitably employed. It cannot be denied that a reliable dog is of inestimable value to a soldier on outpost duty. He is useful as a means of communication between the commander of the piquet and his sentries and patrols, but more especially as companion and assistant of the latter, in detecting hostile parties and guarding against surprise.

As regards carrying information through the lines of an enemy, a dog can, like a pigeon, only succeed under exceptional circumstances. A well trained dog could possibly get through the most vigilant line of sentries, but there is unfortunately an only too efficacious way of entrapping him. While the idea of training war hawks to kill war pigeons has from the commencement been regarded as childish and ridiculous, there is no doubt that there is no simpler means of destroying the war dog messenger than by training a pack of dogs to scent him out and lead him into destruction.

But to convey important news from one part of a force to another and to bring back a reply, which a pigeon cannot always be trusted to do, the dog, especially on dark nights, in bad weather, and over difficult ground, is incomparably more trustworthy and expeditious than a pedestrian or any other kind of messenger.

As dogs are more particularly useful in wooded, mountainous or broken country, they have been chiefly allotted to the Jäger or light infantry battalions, about ten or twelve head to each, and they created a great sensation recently on the occasion of the grand imperial manoeuvres, when the newspapers recorded that the dogs were also trained to succour the wounded like the St. Bernards with basket and barrel, and to carry reserve ammunition to the outposts.

The baggy collar in which despatches are fastened round a dog's neck is a source of danger to him in creeping through hedges or thicket, owing to its liability to get entangled. The hanging leather case and every other arrangement by which a bag is fastened to his body with straps impede his movement and betray him to the enemy. A hollow metal collar with secret spring, made to fit close round the dog's neck, should be adopted.

In conclusion, it may be reiterated that the employment of dogs as carriers of despatches over long distances or through hostile country will from the above mentioned causes always remain fraught with the same uncertainty as the employment of pigeons, but with careful and intelligent training there can be no doubt that a highly gifted breed of dogs would be of inestimable service on outpost duty.

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NOTES ON THE WATERLOO CAMPAIGN,

compiled from COLONEL MAURICE's articles,

By Lieutenant A. A. E. CAMPBELL, 25th Punjab Infantry.

After reading the account of General Bengough's lecture on Ziethen's defence of the line of the Sambre in *Journal of the United Service Institution of India* No. 87 of 1891, and the report of the discussion which followed it, I was reminded of a series of articles on the subject of Waterloo written by Colonel Maurice, which appeared in the *United Service Magazine* last year during 1890. One of these articles, the one in the October number, deals exclusively with Ziethen's operations on the 15th June.

Colonel Maurice does not, I think, claim to decide absolutely any of the much debated points of discussion in this famous campaign of Waterloo; no man at this distance of time with the material at hand could possibly do so, but he brings out many fresh ideas and details that are full of interest, and worth the attention of all who care for military history in general, and the story of the most famous campaign in English history in particular.

With regard to General Bengough's lecture, I think it may be of interest to bring to notice what Colonel Maurice has to say on a number of small points touched upon in the course of the former officer's address and the discussion. In order to do this I will take in succession the "mistakes," on which General Bengough lays chief stress.

(1.)—Napoleon's strategical error in attacking the centre of the allied line, where concentration for the allies was easiest, instead of by a flank where it would have been difficult.

There were, as is well known, three courses open to Napoleon, to strike at the right, the left, or the centre of the Allies. To attempt to get in between the Prussians and the Rhine meant making a main attack a long distance from Paris, through a mountainous, difficult country, through which his forces could move but very slowly, with Namur in his way. He knew how Wellington had disposed his forces, improved the defences and garrisoned the ports of Belgium with a view to defending his base, and he called to mind the tenacity with which the Duke had clung to his source of supply, the sea, in the long Peninsular campaigns. His experience of Allies was that they were selfish. He felt that if he could wedge himself in between the British and Prussian armies, and beat one of the two with his superior forces before the other could concentrate, the effect would be to send each flying to cover his respective communications, and to have the road to Brussels free. He knew the Belgians to be only half-hearted, and he knew a considerable portion of the Saxon and Rhenish contingent was favourably inclined to himself. Finally, his old experience of Blucher told him that the hot-headed Marshal "Vorwärts" would rush to meet him as soon as he touched his outposts. The balance of odds therefore

appeared to favour the plan of striking at the allied centre and at the British first, before the British could concentrate.

Further, "the ground immediately behind Charleroi, around which lay Ziethen's corps, which was also the one nearest the English, was good for movement. But at a short distance behind the great main road, which runs from Quatre-Bras across to Sombreffe and so to Namur, there is ground in the direction of the town of Wavre, watered by the river Dyle, so difficult for troops, that it had been described by Muffling, as impassable for masses and for artillery. If therefore Napoleon, pressing back Ziethen with his greatly superior forces, should succeed in occupying the country as far as the Namur-Quatre-Bras road, he would not only separate the two allied armies, but would oblige them to fall back much farther if they wanted to join one another, because of the nature of this country of the Dyle."

The above roughly represents what Colonel Maurice says on the point. To call Napoleon's plan a strategical error is rather to beg the question. Had he succeeded, who would have ventured to point out his action as a mistake? And he very nearly did succeed. At the close of the battle of Ligny, Blücher led a charge of cavalry with the hope of redeeming his disaster. The charge failed and he was put *hors de combat*. Gneisenau, assuming the command, ordered a retreat on Tilly, which lay some two miles north of the Quatre-Bras-Sombreffe road. Some one objecting that Tilly was not marked on all the maps, Gneisenau ordered the "retreat on Wavre," which is much further north, but in the same direction. Gneisenau was Blücher's head, his brain, and chief of his staff. No one could have known better than he what his order, if literally carried out, meant. It meant that the Prussian army "burnt their boats," separated themselves from their magazines of food and stores, and reversed the whole of the previous plans of campaign. It is very likely that Gneisenau in giving this sudden decision on the spur of the moment, as Colonel Maurice points out, had no intention of joining Wellington at all, but on the contrary to "retreat on the Rhine" by the only route that would enable him first to collect the scattered "wings of his army." Gneisenau had probably no personal wish to join Wellington. He evidently believed that the Duke had deserted the Prussians at Ligny, and broken his promise to come to their assistance. He must have known that if the Prussians joined hands with the British now and the Allies were defeated, the Prussians would be in a far worse position than the British with the sea at their back. The bent of his mind is evident from a letter he subsequently wrote, in which he requires a guarantee that Wellington would stand and fight at Waterloo, and not make a "mere demonstration." Furthermore Colonel Maurice quotes the following anecdote. "Colonel Hardinge had been wounded on the 16th, and he records that as he was lying on his bed Blücher burst into his room, triumphantly announcing: 'Gneisenau has given way. We are to march to join Wellington.'" This probably took place at Wavre.

Before then we can speak of strategical errors, it is as well to enquire into something more than appears on the surface. Here we have

a "strategical error," for which Blucher was responsible, that succeeded, won a victory, and closed a half century of war.

War is all a matter of chance and of circumstances, and it is the commander who makes the fewest mistakes, who wins. The able student of strategy, Prince zu Hohenlohe leads his readers in his letters on strategy only up to the point of the first decisive battle between the combatants, and closes there his remarks. Beyond this he says it is impossible to study deeply, to recognize clearly all the leading motives. The veil that covers the secrets of war becomes then too dense to lift. It will not repay therefore to accuse Napoleon of a strategical error or to forecast what success would have attended him, had he attacked, as the Duke expected he would, the allied right. "*La critique est aisée, l'art est difficile.*" It seems better worth while to investigate the motives that induced him to act as he did, than to look for blunders for which there is no remedy.

(2.)—The extended front occupied by the allies.

This will always be open to adverse criticism, but let us examine the facts.

The Great Powers declared Napoleon to be an outlaw on the 5th March. On the 25th March they bound themselves to furnish all the force in their power to make war with the returned exile. On the 4th April Wellington arrived at Brussels and assumed the command of his "polyglot army." He expected that the allied armies would invade France with a quarter of a million of men by the 1st May, but the Austrians and Prussians moved slowly, and in the middle of June the British army with its attached contingents and the Prussians were still waiting for their allies on the Belgian frontier.

While this enforced delay continued, Napoleon was re-creating an army, and through the force of circumstances the initiative lay with him.

Thus from the 4th April to the 12th June the British and Prussian forces were standing idle, and obliged to spread themselves out over a large area of ground. Even though they were lying in the midst of some of the most fertile country in Europe, it will be readily understood that two armies of over 200,000 men in all could not be kept constantly concentrated in reach of the most likely points of attack for the space of two months and a half. "Napoleon's army a week before the campaign began was at least as widely dispersed as those of the allies."

"Now, as the allied armies in Belgium were simply waiting at least till the 1st July for their friends to move up, it followed that when Napoleon had made up his mind to attack them, it would depend on his choice where the first blow should fall." The Duke of Wellington expected Napoleon to attack the allied right, and to the end of his life held that he would have had most chance of success by so doing.

(4.)—I will now change the order of General Bengough's comments and take the fourth before the third.

Still quoting from Colonel Maurice. "Any French troops that were known to be gathering chiefly at Beaumont, Maubeuge, and Solré-sur-Sambre portended attack on Mons rather than on Charleroi,

"not only because the distance to Mons is less than to Charleroi, but because better roads lead to Mons than to Charleroi. The town of Valenciennes, one of Napoleon's fortresses, lies about as much to the south-west of Mons as Beaumont lies to the south-east of it. Any concentration of French troops therefore expressly at Valenciennes, Maubeuge, and Beaumont would very distinctly imply attack on Mons and not on Charleroi. Napoleon was actually gathering his army at Solré-sur-Sambre, Beaumont, and Philippeville. If these positions of his army were actually known to Wellington, then, taken together, they would imply attack on Charleroi and not on Mons. Everything therefore in this respect would depend on whether the information received tended to point out Valenciennes as the other town besides Maubeuge (or Solré-sur-Sambre) and Beaumont, or tended to point out Philippeville as the third town. Philippeville would imply attack on Charleroi, Valenciennes on Mons."

The following is the information received by Wellington. It will be seen to suggest a concentration on Mons, and therefore on Wellington's flank, the right flank of the allies.

June 9th. Prince of Orange reports Napoleon's arrival at Maubeuge. (Note, Napoleon did not leave Paris, until June 12th.) Colonel Dillon reports considerable force of troops at Valenciennes.

June 12th. Dörnberg reports attack imminent, and that between Philippeville, Givet, Mézières, and Maubeuge there are 100,000 men. Voisin reports that French army expects to be at Mons on 15th, but only 45,000 troops available for the attack. (Note. This taken together points to movement of French troops from French right to left.)

June 10th. Uxbridge reports Napoleon's arrival at Laon and attack imminent.

June 13th. Dörnberg from Mons passes on Ziethen's reports of a movement from Mézières by Beaumont on Maubeuge (*i. e.* from the French right to left, towards Mons and away from Charleroi, taking away, for the purpose of a warning of attack on Charleroi, all value from Dörnberg's own report of the day previous of the presence of troops at Philippeville.) He further reports a movement from Valenciennes on Maubeuge, and generally a concentration on the latter, *i. e.* directly to the south of Mons on the main highway leading there.

Behr, same date, reports 20,000 troops arrived at Valenciennes, and many at Maubeuge.

June 14th. Dörnberg reports Maubeuge concentration to be only for a review.

Hardinge reports (at 10 p. m.) movement from Maubeuge on Beaumont, and sends Ziethen's reports of fires at Thirnmont, close to Beaumont, and at Merbes.

Dörnberg (3 p. m.) reports concentration of entire French army on Maubeuge and Beaumont.

NOTE.—"No fires had been seen in the direction of Philippeville." The information as to these camp fires in fact rather confirmed the idea of a concentration south of Mons. As a matter of fact, although Napoleon's concentration of his left column at Solré and centre column around

Beaumont was completed by the evening of the 14th, his right, consisting of the 4th corps under Gérard, which was to have been at Philippeville, had not all arrived. Naturally up to the morning of the 15th, the French appeared stronger towards the allied right than towards the left.

The above was the information received by Wellington up to the morning of the 15th June, "conflicting, contradictory, and false in some respects." "When, then," continues Colonel Maurice, "at 3 p. m. the Duke received a report from Ziethen (despatched at 4 a. m.), informing him that his outposts were engaged, what was the legitimate inference to be drawn! There is no more common *ruse de guerre*, none in which Napoleon more frequently indulged, than a false attack. * * * Attack on Ziethen's outposts might mean a mere skirmishing affair, or it might simply be the right flank of the French army threatening the Prussians, in order to leave clear the road to Mons, and deceive the allied commanders as to the intended line of attack. To concentrate the allied army eastwards might clear the way for attack from Mons upon Ath and Grammont, cutting the English off from the sea * * * Wellington's vast experience of war must have made him particularly unwilling to be led off on a false scent by the first reports of a trifling skirmish."

He therefore merely issued orders about 5 p. m. for the divisions of the army to be in readiness to concentrate, but not to move "until it is quite certain that the French attack is upon the Prussian right or our left". About the same hour he heard from the Prince of Orange in person, that the Prussian outposts had been driven in, and from Müffling that Blücher had written at noon that the French appeared to be advancing on Charleroi. The Duke then sent an express to Dörnberg for further news from Mons. At 10 p. m. he received news from Blücher that Napoleon had passed Charleroi. Upon this he issued orders for the troops to move, parading at Brussels at 4 p. m. This hour, in consequence of Dörnberg's reply to the message sent by the Duke, that the French had all moved off towards Charleroi, was subsequently altered to 2 a. m. "The Duke *then* decided himself to go to the ball, saying to Müffling, 'The numerous friends of Napoleon here will be on tiptoe; the well-intentioned must be pacified; let us therefore go to the Duchess of Richmond's ball, and start for Quatre-Bras 'at 5 a. m.'"

It was no doubt a very fortunate thing that General Perponcher should have kept his brigade of Dutch-Belgians at Quatre-Bras on his own responsibility, instead of moving them to the point of concentration of his corps at Nivelles, and that this brigade should have been so promptly reinforced by the remainder of the division; but there is this to be said, that Perponcher from his position had better means of knowing what was really going on at the front, and would probably feel the pressure earlier.

It seems fairly evident from the above, that the Great Duke acted up to the best of his own judgment and the information supplied to him, and that if he might have moved sooner, it was owing to caution that he did not yield to the "first report of a trifling skirmish," a report that did not tally with previous information. There was moreover a political reason for his attendance at the famous ball at Brussels.

One more remark as to the omission to hold Quatre-Bras. Wellington, it is notorious, did not hold it in any strength. On the contrary, he is said to have been actually angry at the urgency of the Prince of Orange begging him to consider the importance of that place. He ordered the concentration on Nivelles, out of the reach of the French advance. Napoleon did not expect at Quatre-Bras any resistance, beyond that of a rear-guard or retiring detachment. He assumed that Ney would easily force the crossing of the great highways, and turn to his assistance against the Prussians, and afterwards clear the way into Brussels for him. Now, when "Wellington and Napoleon are both entirely agreed on a question of war, he is a bold man who traverses their opinion."

(3.)—The unreadiness of the 4th Corps (Gérard) to participate in the general advance of the French on the morning of the 15th.

This corps had not all arrived at its *rendezvous* by the 14th, "in consequence of the bad roads by which it had travelled in the long march from Metz."

Gérard started at 5 A. M. on the 15th in his advance from Philippeville. Suddenly it was reported that the commander of his leading division, General Bourmont, had deserted. The corps was moving at the time on Charleroi. Its direction was changed to the bridge of Châtelet on receipt of this information by Napoleon. Hence delay, through an alteration in the original direction of the march.

With regard to the point noticed by General Bengough, the neglect to send an important order by a double messenger, Colonel Maurice devotes a whole article to the "Three Staffs" and their errors of omission and commission. These are not few, notably the delay in transmitting the reports of Dörnberg and Behr on the 15th to the Duke; Ney's appointment to the command of an army on the very eve of a decisive battle; the "wanderings of D'Erlon's corps;" the omissions to inform Ney of the result of the battle of Ligny; the neglect of the English staff in not bringing Blücher's messenger to the Duke with the same news; the absence of Bülow's corps from Ligny, and so on. "It is curious that within the few days of this short campaign, almost every blunder that a staff ought to avoid seems to have been committed by some one of the three staffs".

(5.)—Ziethen's defence of the line of the Sambre.

Ziethen has been blamed for not breaking up the bridges over the river. In his defence it must be pleaded, that in the first place the Prussian leaders did not know for certain until the 15th that Napoleon was intending to seriously attack their line of front. Moreover the allies were contemplating an invasion of France. Secondly the allies generally seem to have been most careful in their treatment of the people of the country occupied, private property, and public buildings. The inhabitants were not wholly friendly, and it was necessary to keep on the right side of them. Thirdly, Ziethen was in close communication with his own head-quarters, and the blame for not having broken up the bridges must be ascribed to his superiors, rather than to Ziethen himself. He probably was under orders, to leave the bridges intact.

There can be no doubt, as General Bengough says, that a stiffer defence was possible, and that had these bridges been thoroughly prepared for defence etc., the French might have been prevented crossing until nightfall. This, however, was not done, and General Ziethen had to do what he could to defend a river with unbroken bridges. This problem he solved in a manner that proved his own skill and ability, and has roused universal admiration.

I will conclude with one more quotation in full from Colonel Maurice :—

"To me it has always seemed that the point in Ziethen's handling of his corps to which least justice has been done, is his use of his strong supporting force as a connecting link between the two fighting brigades. It enabled him to do what he in fact did; to rally each of the two brigades, 1st and 2nd, (1st Brigade, Steinmetz, at Fontaine l' Evêque, nearly cut off; 2nd Brigade, Pirch, which bore the brunt of the attack, stationed about Marchienne, Charleroi, and Châtelet), when it had done its work, and to establish connection between them. I find it often asserted that a more vigorous defence might have been made at the river itself; I cannot think so. The nicety of the operation lay in this, that if one of the bridges was forced, the rest would immediately be turned. It was essential to hold Charleroi longer than Marchienne, in order to secure the retreat of the force from Marchienne. It was essential to abandon Charleroi soon after Marchienne had fallen. Yet it was necessary to hold both long enough to prevent the French from compromising the march of Steinmetz's brigade."

"If instead of the slender force actually placed at the bridges with rallying forces behind them to secure their retreat when repulsed, Steinmetz [? Ziethen] had distributed his corps along the river, in order to take advantage of that obstacle longer to delay the French, the effect must have been, that when one of the bridges was forced, the large numbers on the river would have been unable to get away."

To attempt to touch upon any more of the points of interest of this campaign as treated by the writer I have quoted throughout, would be to lengthen these "notes" unnecessarily.

If I have roused the interest of any of my brother officers, unacquainted with Colonel Maurice's admirable articles, enough has been said.

THE "REVOLVING" TARGETS.

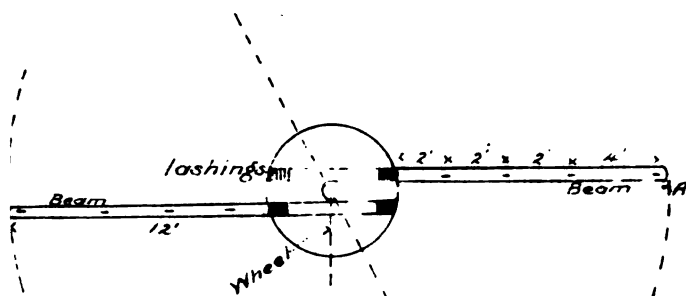


Fig 1.

showing position
the pivot with
ard to butts.

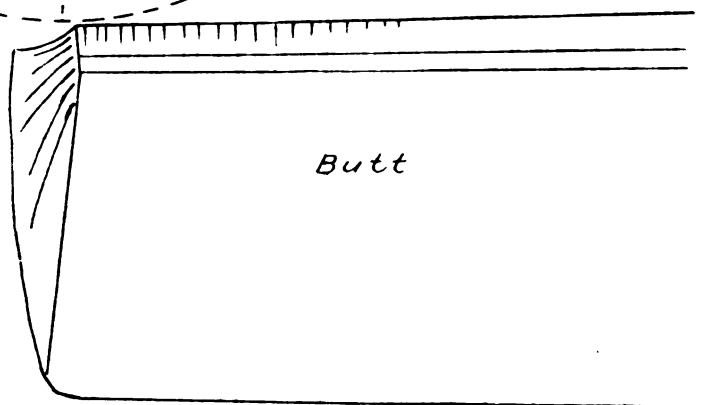


Fig. 2.

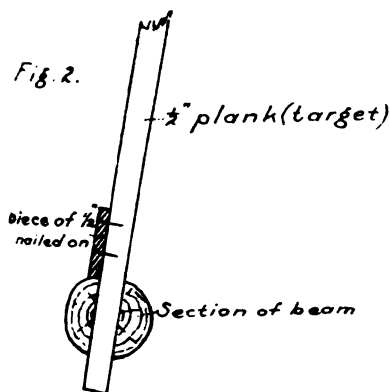
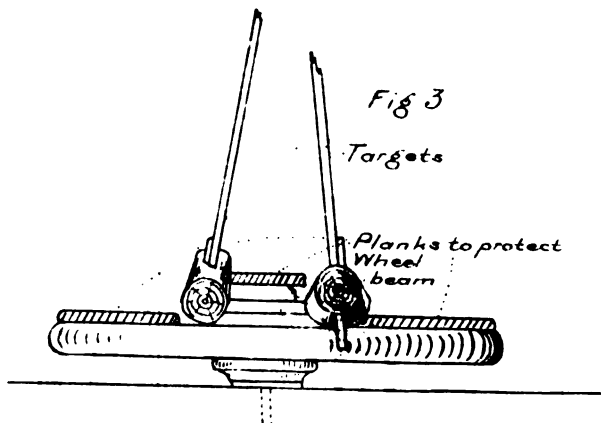
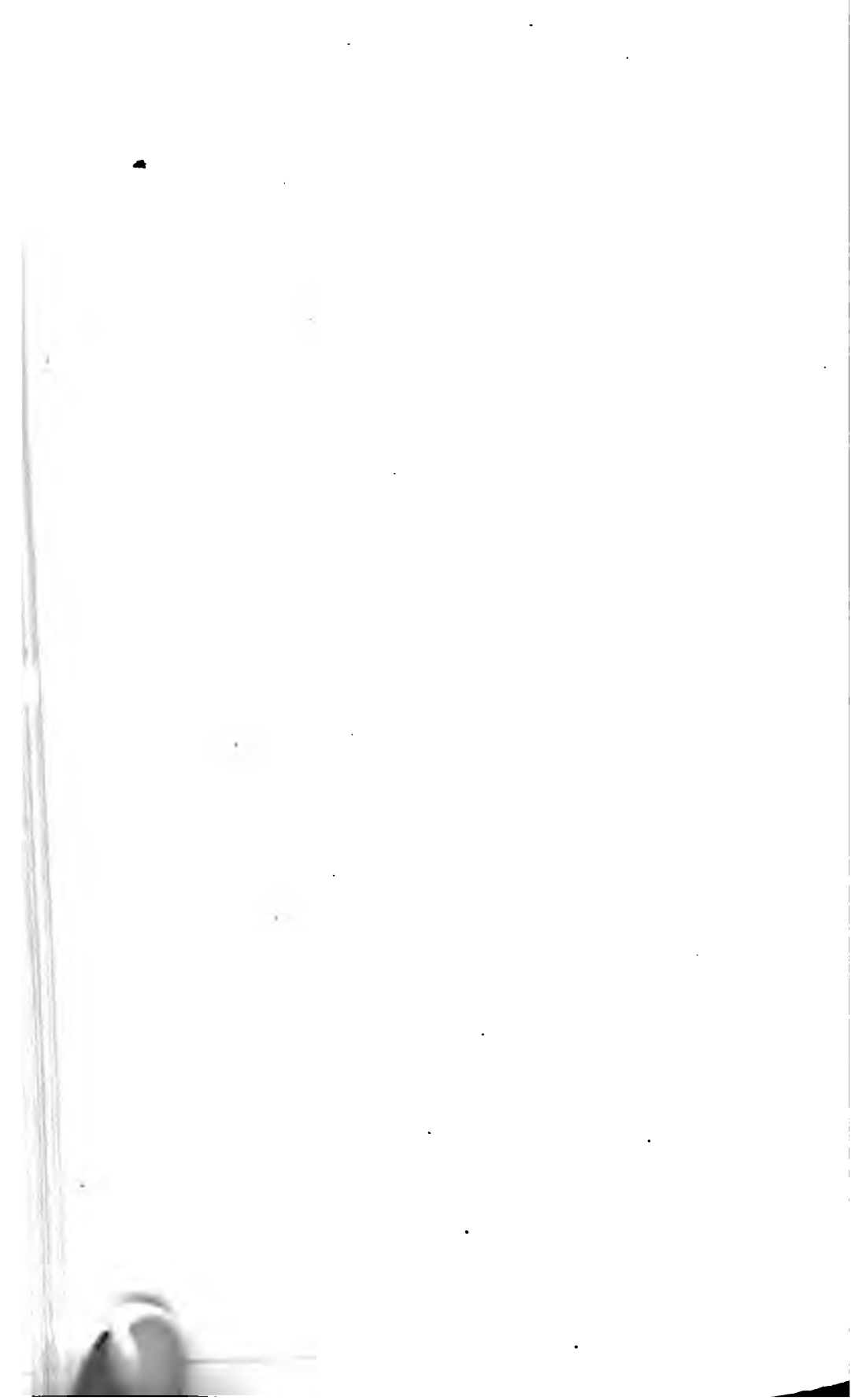


Fig 3



SECTION OF SLOT AND
FOOT OF TARGET.

ELEVATION OF WHEEL
AND BEAMS,
(lashings omitted.)



REVOLVING TARGETS,

as used in the 45th Rattray's Sikhs,

By Major H. N. MACRAE, 45th Sikhs.

The accompanying sketches illustrate the method of using horizontally revolving targets.

Description.—An old phaeton wheel and half an axle fixed in the ground to rotate freely horizontally (Fig. 1, 3, 4).

On this wheel are fastened (with rope lashings) two light undressed bullies (3" to 4" at tip) acting as arms, in which are cut slots to take the regulation wooden targets with legs a little longer than usual. The arms are raised or lowered, and the lashings tightened or loosened by means of a wedge (Fig. 4), as required to keep clear of the ground.

The legs have a piece of half inch plank (Fig. 2) nailed on to them at such points as to keep the targets vertical, however slanting the arms may be. The dimensions given in the sketches proved satisfactory.

The pivot (axle) was placed in a line with the end of the masonry of the butt. As an extra precaution the wheels were planked over (Fig. 3).

NOTE.—It was found that with half inch planks the targets warped occasionally. $\frac{3}{4}$ " or 1 inch would perhaps be found better, unless the wood is well seasoned.

If heavy cart or gun wheels could be obtained of a government pattern (that is with good, though old, boxes), the two beams could well be replaced by one large beam. This would perhaps look better, but it would be heavier and more expensive. With the rope lashing and ordinary bullies actually used, any repairs or alterations can be made on the spot without loss of time.

Working.—A "party" consisted of 1 N. C. Officer to register,

1 Sepoy to turn,
1 " to signal,
1 " to patch out.

On a shot being fired the sepoy near A (Fig. 1) gives the inner beam a shove with his crook and brings the outer target to B.

Inspected and patched, it is at once moved to A, and the shot signalled, whilst the fresh target is in position to be aimed and fired at.

Further to hasten the working, a system of stationary signals was used, as illustrated in Figs. 5 and 6.

A. A. Half inch plank about 6 feet long, 6 to 9 inches wide.

C. C. Two pieces of wood pivoting on screws G. G.

E. A spring (*Kamani*), fastened by a screw to a rigid block D.

This spring tends to force out the ends (T.T.) of the pieces of wood C, thereby making them grip a collar B.

B. A square wooden collar on a bamboo (M. M.) about 6 feet long, fixed rigidly about half way. It has rounded corners.

M. M. This bamboo passes through a hole in the plank. A second collar (F) may be attached below the plank.

S. S. A sheet of coloured tin about 15 inches square.

The following colours were chosen :—

- 1.—*One side* all white for a centre. The *other side* white and red diagonally, for bull's eye.
- 2.—*One side* all black for an outer. The *other side* black and white, diagonally, for magpie.
- 3.—*One side* all red for a miss. The *other side* red and black, diagonally, for a ricochet.

Fig. 6 shows the relative positions of the signals as placed in the central butt.

The discs when "end on" are *invisible* on the range.

The "spotting discs" were used as usual; but, instead of as well indicating a shot on a fresh target as it came up by using a "long handle disc", the approximate position was indicated by putting a hand disc in a relative position with the stationary disc:—Thus (see Fig. 7), signal (*a*) reads miss left little high. Signal (*b*) reads miss right, low. Signal (*c*) reads miss little right, high. These stationary discs can be made to turn very easily.

The arms need not necessarily be hidden from view. As long as the wheel and axle are protected by the butts, the arm, though exposed, will stand many a course of annual training before it need be replaced (at the cost of Re. 1-8).

I think the Revolving Targets work better all round than any others I have seen. The material is everywhere obtainable. They are easily put up with unskilled labour, they work quickly, and are less fatiguing. There were no complaints and the process was quicker than the old way.

H. A. S.

SOME OF THE PROBABLE RESULTS OF THE INTRODUCTION OF THE NEW MAGAZINE RIFLES,

By Lieut.-General H. R. BROWN.

It is difficult to discuss the merits of an arm that has not as yet been tested in actual service. Deductions from theory and the results of experimental practice are often misleading. The testing of a limited number of arms, either by detachments of soldiers, or by experts, affords little that is reliable, as an indication of what will happen when the same arms are used in larger numbers and under the conditions of actual service.

It may not, however, be amiss to consider "probabilities."

The chief features of the new arm are reduced calibre, increased range, high velocity, and low trajectory; a power of firing several consecutive shots with great rapidity; and a lighter cartridge, enabling the soldiers to carry a greater number of rounds. A further feature is the proposed adoption of smokeless powder, as soon as a reliable explosive of that nature has been found, suitable for small arms.

The first and most important question seems to be—

What is likely to be the effect of the projectile? Will more men be killed? Or will the proportion of wounded be increased? And what will be the nature of wounds? Will they be severe or slight in their character? Will lengthened treatment in hospital be required, or will recoveries be accelerated? These are questions of great consequence.

Reasoning upon probabilities, it may be expected that the long thin bullet, travelling at high velocity, will inflict numbers of wounds not very severe in their character, clean wounds not aggravated by fragments of lead or clothing, and not causing the shocks to the system hitherto so common, and therefore more easily and quickly healed. But from the low trajectory, it may be inferred that the numbers of men wounded will be considerably increased. Possibly the numbers killed will be reduced, vital parts are less likely to be injured by the passage of bullets of very small diameter.

Assuming that the percentage of wounded in future actions will increase, the necessary consequence must be an increase of hospital staff, hospital accommodation, transport for wounded, and means of removal of wounded from the field; as well as more complete arrangements for treatment *on* the field before removal to the hospitals.

If it should prove, as seems probable, that this increase of wounded will occur, any want of preparations in any of the above respects would be severely felt, and could not be remedied.

The next question is, Will this light small bullet prove effectual in stopping the advance of men and horses? Or will the shocks be so slight as not immediately to arrest further movement?

The chances, or probabilities, seem in favour of considerable numbers of men and still larger numbers of horses, receiving wounds of

which, "though possibly severe," they will hardly be conscious at the moment, not disabling them from continuing effectively in the ranks in which they are fighting for some time after the receipt of their wounds.

The power to stop charging cavalry, or of preventing batteries of artillery from coming into action at short range, will be affected by the same causes. The former considerably so. Both points, if they prove true, constitute tactical questions that will have to be considered.

The new rifle is said to have a useful range of 3,000 yards, that is to say, at that extreme distance the bullet is capable of inflicting injuries, the really effective fire extending to 1,500 or 1,600 yards. What effects are to be expected in action from this greatly extended range?

The proportion of aimed fire, depending as it does on causes wholly unconnected with rifle and ammunition, is not likely to be affected either way; neither will it ever be affected to any marked degree, until a new race of soldiers whose nerves cannot be disturbed by the dangers and excitement of battle, has been discovered.

The unaimed fire, representing a very large percentage of the whole expenditure of ammunition, is not unlikely to produce less effect than hitherto, unless upon reserves and other troops at great distances, and upon these it is not probable that any material differences of effect will be experienced. Certainly, troops under cover of undulating ground, at moderate ranges of 1,500 or 1,600 yards may be expected to suffer less.

The Martini-Henry rifle, having a low velocity, has a considerable power of searching out undulating ground and other cover, the angle of descent of the projectile at 1,400 or 1,500 yards and upwards being favourable for that purpose. The new rifle, giving a very high velocity to the bullet, something like 700 feet per second in excess of the old arm, will not have the same power, unless at proportionally increased distances. The action of gravity, "on which this searching out power entirely depends", being constant, it follows that the higher the velocity of the projectile, the less will be the effect at equal distances. Equal angles of descent can only be produced by retiring further and further from the point to be searched out, in proportion to increased velocity.

The distances at which ground can be effectively searched out by the new arm ought to be carefully ascertained and studied. The power of preventing troops from collecting and remaining uninjured under cover is of great value.

Having regard to this, "cards" plainly marked with lines, shewing the angles of descent of the new bullet at every 100 yards, from 2,000 to the extreme range of the rifle, might very usefully be issued to all company officers and non-commissioned officers.

Those who have at all studied the general conformation of ground can usually form a fair idea of the nature of reverse slopes and other undulations, so that by reference to the card, an officer directed to search out a particular position could place his men, at "approximately" the distance likely to produce the best effect, *i. e.*, he would select the distance at which the angle of descent most nearly corresponded to the presumed slope of the ground.

"Really effective range cannot much exceed the distance at which ordinary eye-sight is able to distinguish ordinary objects such as men, horses, and guns, nor can it greatly exceed the average distance for which fairly level ground presents itself. These distances rarely go beyond 800 or 1,000 yards, and in many cases and under many circumstances are decidedly less."

But the new arm, so far as its power is concerned, is capable of effective aimed fire, to 1,500 or 1,600 yards.

The probability at present is that a great portion of this extended efficiency will be thrown away. Unless some means can be found of supplementing the training of the men, it is doubtful whether the greater number of the soldiers in the ranks are able to see distinctly objects of the size of men and horses at the distances to which the fire of the new rifles would otherwise be perfectly effective. There is no advantage, or at any rate very little, in placing in the hands of the rank and file rifles whose effective range is beyond their own individual powers.

The question is not easy of solution. It might be possible to furnish with each rifle a small and easily adjustable telescopic sight, that could be carried in the pocket, and used only by direction of company officers, when accurate long range firing is desired. There can be no hurry on such occasions, and the plan seems feasible.

The low trajectory of the new bullet, consequent on high velocity, opens several probabilities to consideration, and may, other things being equal, produce results beyond anything anticipated at ranges within 500 or 600 yards. One of the first of these is, that although the adjustments may be necessary when practising at targets, with figures of merit in view, it will be found that practically "in the field" no alteration will be required up to fully 500 yards. This advantage can hardly be over-estimated.

Alterations of sighting in action, unless at long ranges, can seldom be relied upon as having been properly made. The company officers cannot look to every, or indeed to any, rifle during close engagement.

"Five hundred yards is a probable distance within which no alteration of sighting will be needed in action. The ricochet of bullets striking short will still be generally effective."

"The flatness of trajectory renders it not unlikely that the considerable percentage of shots known to pass over-head during action, will be reduced, not perhaps very largely, for the cause is not with the rifle but with the soldier using it, but still reduced sufficiently to produce sensible effect. And this effect will vary greatly in relation to the steadiness with which control is exercised by the company officers and non-commissioned officers."

Another probable result of the low trajectory will be the discovery, that the present amount of training in judging distance at short ranges is hardly necessary, and that very much more is required at the larger ones, *i. e.* from 500 or 600 yards and upwards, and also, that training on unknown ground, and in new situations, is of far greater importance than has hitherto been acknowledged.

The very extended range of the new rifles opens for consideration the possibility of utilising its full powers. Estimates of distance, beyond 1,500 or 1,600 yards, can hardly be made with any approach to accuracy by infantry in action, or by any instrument at present placed in the hands of infantry officers. Artillery may judge their long ranges with fair accuracy by the burst of shells, but infantry soldiers have no guide of that kind for the use of their rifles.

It seems probable that light balloons must come into extensive use with this object, amongst others, in future wars. "The introduction of smokeless powder alone will necessitate it." An officer or other trained observer, ascending perhaps 800 or 1,000 feet, would view almost the entire surface and undulations of ground within possible range. He can observe by compass the exact direction of bodies of troops; he can take with fair accuracy the angle subtended by these troops, and he can communicate these immediately to another observer below him, who may easily and quickly take a ground angle in the direction indicated. There will then be a known height from the ground to the balloon and two known angles, of which the accuracy would be sufficient to give an approximate estimate of distance. With practice not much time would be lost, but trained observers would be necessary.

A few years ago these suggestions would have appeared absurd. But if it is recollected that field telegraphs in the present day not only accompany troops in the field, but have even been laid down and utilised during the progress of an action, there is no reason for doubting that a balloon service, for reconnaissance and for such purposes as are indicated above, is quite within the range of practical application.

The next question is, the effect that will be produced by the magazine, *i. e.* by the power of firing rapidly a number of consecutive shots without the delay of reloading. Very great uncertainties enter into this portion of the subject.

If it could with any confidence be assumed that full magazines would be reserved during an action till supreme moments arrived, that the rapid fire would be well directed and magazines immediately and regularly refilled, the advantages of the system could hardly be called in question.

But probabilities are much against these conditions. Supreme moments in action are moments of great excitement. The regularity which would ensure the full use of magazine fire cannot be reckoned on. Many magazines will have been partially or wholly emptied. Some, if they are detachable from the rifle, will have been lost, or their springs or attachments broken; in other cases men will forget that their magazines are ordinarily cut off from use. It is probable that from these causes combined a loss of at least 10 to 15 per cent of effective fire will accrue.

Assuming, however, that by careful training and supervision magazines can be properly utilised at proper moments, will the fire be well sustained and well directed? The answer to both questions is a probable negative. The very rapidity of the fire is almost certain to cause wild and ill-directed shooting. With smokeless powder no doubt some control of direction may be possible, but until that is in general use, there

can be little hope of an effective well-directed fire from magazines. Smoke alone will prevent it, to say nothing of increased excitement.

Beyond the few rounds contained in the magazines, the fire cannot be sustained ; there must be considerable cessation of fire during refilling and replacing magazines, which might give great advantage to an approaching enemy, an advantage he would not acquire in presence of ordinary breech-loading arms, whose rate of fire cannot only be sustained as long as necessary, but is actually superior after the first few moments. Twenty rounds can be fired in less time from an ordinary breech-loader, than the same number from an arm whose magazine requires to be once or twice refilled, and the fire will probably be better directed, more effective, and more under control. The advantage of the magazine principle is at least open to question ; "war" alone can decide the point.

The great change of all others likely to follow the issue of the new rifles is the possible introduction of smokeless powder.

It is not yet by any means certain that such an explosive will be finally adopted ; important questions of manufacture, storage, uniformity, and the power of resisting variations of temperature during long periods have yet to be settled. But the introduction is "probable." Assuming, however, that all difficulties will be overcome and a smokeless powder finally approved, tactical considerations of no small consequence are likely to arise.

It will no longer be easy during an engagement to distinguish the points from whence fire is proceeding. Heavy losses may be increased before any attempt at reply can be made ; "surprises" will probably be more frequent. The exposure of troops, no longer partially concealed from view by smoke, must necessarily be greater, and greater care will have to be taken in their disposition on the field.

Outpost services, and those of advanced guards and escorts will have to be conducted with greater care, and some alterations of principles may prove necessary. All these points will be intensified if, as has been asserted, the new explosive should be comparatively noiseless, as well as smokeless.

The only thing "certain" in respect to the new arm, and its present and future use, is, that more will be demanded from officers, especially the company officers, and also from non-commissioned officers.

Increased application to military subjects, the study of leading troops efficiently and of their disposition in the field will be more imperative than ever. The responsibility of officers for the proper leading of their men will be greatly increased. There are times no doubt when all consideration of loss and danger must be absolutely discarded, but in the general operations of war under future conditions, the losses sustained by troops engaged will bear an almost direct proportion to the skill and ability with which they are led, quite as much so as their hopes of success against an enemy. The high professional training of all officers has become not merely a point to be desired, but an actual necessity of modern war. Company officers in particular, and also their non-commissioned officers will have new and greater responsibilities thrown upon them, and they must prepare to accept them.

The few remarks in this short paper are purposely written without entering into detail, with the object of drawing attention to questions that may be usefully discussed. If they should have that result, the trouble of writing them will be amply repaid.

As to the rifle itself and its construction, the opinion even of experts differs considerably. But the same differences of view have happened on every occasion of the introduction of new and improved arms.

There are, and always must be, weak points, that only shew themselves when large numbers of arms are dealt with, and others that are due to miscalculation of strength and relative adaptation of parts, but all these usually admit of remedy. The perfecting of the arm for military use, so long as the general construction is mechanically sound in principle, is simply a question of time and experiment.

MONUMENTS OF HISTORICAL INTEREST.

FEROZEPORE.

(CANTONMENT CEMETERY).

(The index extracted from the Chaplain's Register, which was circulated under Punjab Department Public Works No. 1752 of 16th March 1891, has now been revised in accordance with a Memorandum received from the Government of India, Military Department, under No. 2623B, of 17th September 1891. Notes have been added to the inscriptions copied by me during my visit to Ferozepore in February 1891 from the same Memorandum. The Cemetery is under the charge of the Military Works Department.—A. LeM.)

NAME.	Date of decease.	Description of monument.	REMARKS.
Captain Holmes, 12th N. I. ...	23rd Feb. 1846	St. M.	Wounded in action Ferozeshah.
Lieut. Douglas Beatson, 14th N. I. ...	10th Feb. 1846	St. M.	Wounded in action Ferozeshah.
Major-General Sir J. R. Lumley, K.C.B.	1st March 1846	M. M.	
Lt. Robert Hay, Bde.-Major, 50th N.I.	10th Feb. 1846	St. M.	Killed in action Sobraon.
Captain Warren ... { H. M.'s 53rd } Lieut. Clarke ... { Regiment. }	10th Feb. 1846 21st Feb. 1846 15th Feb. 1846	M. Slab. {	Killed in action Sobraon. Wounded in action Sobraon. Wounded in action Sobraon.
Adjutant Dunning...	6th April 1846		Wounded in action Sobraon.
Anne Sarah, wife of Lt.-Col. R. Napier	30th Dec. 1849	St. M.	
Lieut. H. J. Edwardes, 15th N. I. ...	14th Nov. 1848	M. Slab.	Erected by brother officers and his brother Herbert.
Capt. Jasper Trower, No. 7 Light Field Battery.	18th Dec. 1845	M. M.	Killed in action Moodkee.
Colonel Vicomte de Facieu ...	4th Dec. 1843	B. M.	
Capt. Robert Lee Burnett, 54th B. N. I.	29th Jan. 1843	St. M.	Wounded in action Jugdullak, 18-10-42, Afghanistan.
Capt. William Hore, 18th N. I. ...	21st Dec. 1845		
Sir R. H. Sale, G.C.B. ...	21st Dec. 1845	M. M.	Killed in action Ferozeshah.
Major George Broadfoot, 34th M. N. I.	21st Dec. 1845	M. M.	Wounded in action Moodkee.
Lieut. Colonel L. Bruce, 12th B. N. I.	31st Dec. 1845	M. M.	Killed in action Ferozeshah.
Major Arthur William Fitzroy Somereast	23rd Dec. 1845	M. M.	Wounded in action Ferozeshah.
Colonel Charles Cyril Taylor, C. B., H. M.'s 29th Regiment.	10th Feb. 1846	B. M.	Wounded in action Ferozeshah.
Sir Robert Henry Dick, Major-General, K. C. B.,	10th Feb. 1846	M. M.	Killed in action Sobraon.
Colonel Bolton ...	4th Jan. 1846	M. M. {	Wounded in action Moodkee.
Major Baldwin ...	30th Dec. 1845		Wounded in action Ferozeshah.
Captain Willes ...	24th Dec. 1845		Wounded in action Moodkee.
Lieut. Pollard ...	21st Dec. 1845		Wounded in action Moodkee. Killed in action Ferozeshah.
Lieut. Hart ...	18th Dec. 1845	M. M. {	Killed in action Moodkee.
Lieut. Bernard ...	21st Dec. 1845		Killed in action Ferozeshah.
Lieut. Brenchley ...	19th Dec. 1845		Wounded in action Moodkee.
Lieut. Tritton ...	10th Feb. 1845		Wounded in action Sobraon.
Ensign Jones ...	? Feb. 1846	M. M. {	Wounded in action Sobraon.
Surgeon Gahan ...	29th Dec. 1845		Wounded in action Moodkee.
Capt. John Francis Egerton, Ben. Art.	23rd Jan. 1846	M. M.	Wounded in action Ferozeshah.
Major Henry Delafosse, C. B., Ben. Art.	3rd Oct. 1845	St. M.	
Ensign George Mitchell, H. M.'s, 29th Regiment.	18th Feb. 1846	M. Slab.	Wounded in action Sobraon.
Surgeon Robert Beresford Gahan, H. M.'s 9th Regiment.	29th Dec. 1845	St. M.	Wounded in action Moodkee.
Lieut. and Brevet Capt. Peter Nicolson, 28th Regiment B. N. I.,	21st Dec. 1845	St. M.	Killed in action Ferozeshah.
Capt. Bolton ... { 2nd Regt N. I. }	7th Jan. 1846	M. M. {	Wounded in action Moodkee.
Ensign Armstrong ... }	21st Dec. 1845		Wd. in action Ferozeshah. Killed in action Ferozeshah.

All in Masonry graves.

B. M., M. M.=Masonry Monument; St. M.=Stone Monument.

Stone Monument.

Sacred | to the Memory of | CAPTAIN WILLIAM BURVILL HOLMES |
 who died on the | 23rd February 1846, | from a wound received on the |
 21st December 1845, | at the battle of Ferozeshah. | Aged 41 years.

(N.B.—His regiment was the 12th Native infantry. A. LeM.)

Sandstone Monument—Iron Railings.

In Memory of | DOUGLAS CHARLES JARIN BEATSON, | Lieutenant |
 14th Regiment N. I. | He was wounded in the action | of Ferozeshah,
 21st December 1845, | and again | mortally | at Sobraon, 10th February
 1846, | and died aged 24 years and 6 months | on the 16th February |
 1846. | As a mark | of their esteem and affection | for his high and
 endearing | qualities, | the officers of his Regiment have raised | this
 monument | to their departed comrade.

(N. B.—The Christian name was Turing and not Jarin.—A. LeM.)

A poor brick erection 7' x 4' x 3', Sandstone tablet which will
 soon decay.

Major General | SIR J. R. LUMLEY, K.C.B., | Adjutant General of
 the Army. | Died XXVIII February MDCCCLVI.

(N. B.—The date of decease was 1st March 1846.—A. LeM.)

Sandstone Monument—Iron Railings.

Sacred | to the Memory of | Lieutenant ROBERT HAY, | of the | 50th
 Regiment, Native Infantry, | and | Major of Brigade to the 2nd Infan-
 try | Brigade of the Army | of the | Sutledge, who was killed in action
 at | Sobraon | on the 10th February | 1846 | To know Robert Hay
 was | to love and respect him | Erected by his afflicted | friend | Lieut-
 Colonel WILLIAM GARDEN, | in testimony of the esteem and | affection
 which he bore towards him.

Large stone slab on brick.

In Memory of | Captain WARREN, | Captain SMART, | Lieutenant
 CLARKE, | and Adjutant DUNNING, | all of Her Majesty's 53rd Regi-
 ment, | who fell at the | battle of Sobraon. |

This monument is erected | by their brother officers. |

Sandstone Monument—Marble Tablet, Iron Railings.

Sacred | to the Memory of | Anne Sarah, | the beloved wife of |
 Lieut.-Colonel R. NAPIER, | Bengal Engineers, | who died, aged 29 years, |
 on the 30th December 1849, | humbly relying on the promise of | Sal-
 vation through Jesus Christ. |

(Lord Napier's first wife.)

Brick with sandstone slab on top.

Here lies | HENRY JOHN EDWARDS, | Lieutenant, 15th Native In-
 fantry, | who was killed | by a fall from his horse | on the 14th Novem-
 ber | 1848 | while proceeding | to join his Regiment | in the Second
 Sikh campaign, | aged 30. The officers of his corps | and his brother
 HERBERT | erected this tablet | to his memory. |

Brick Monument—Marble Tablet.

Sacred | to the Memory | of | JASPER TROWER, | Captain, No. 7
Light Field Battery, | Foot Artillery, | killed | at the battle of Mood-
kee | while gallantly leading into action. | December 18th | A.D. 1845. |

Brick Monument—Marble Tablet.

Erected | to the Memory | of | Colonel VICOMTE FACIEU, | who died |
on the 4th of December 1843, | by his most affectionate daughter. |

Sandstone Monument.

To | the Memory of | Captain. ROBT. LEE BURNETT, | 54th Regi-
ment Bengal Native Infantry. | An Officer held in deserved estimation |
and as thorough a soldier as ever lived. He | died at Ferozepore on the
29th January 1843, | from the effect of a wound received at | Jugdullak
on the 18th October 1842, | the last of three wounds honorably taken |
in action in Afghanistan. | Erected by his brother Officers to mark
their | sense of his bravery and worth, |

Brick Monument—Marble Tablet.

Sacred to the Memory | of | Captain WILLIAM HORE | of the 18th
Regiment, Native Infantry, | Assistant Secretary to the Government of
India, | Military Department, | who fell in action at | Ferozeshahur | on
the 21st December 1845 | while in attendance on the | Right Hon'ble
the Governor-General of India. | Aged 36 years.

Brick Monument—Marble Tablet

Sacred | to the Memory of | Sir R. H. SALE, G.C.B. and G.C.D., |
died 21st December 1845, | in consequence of wounds | received in the
| battle of Moodkee | on the 18th of December | 1845.

Brick Pillar 6 feet high—Very small Marble Tablet.

Major GEORGE BROADFOOT, C.B., | Madras Army, Governor General's
Agent, | N. W. Frontier, | the foremost man in India | and | an honor
to Scotland. | He fell at Ferozeshahur ; December 23rd 1845. | aged
38 years. | Erected by his oldest friend | and | comrade | Captain COLIN
MACKENZIE, | Madras Army, | (See below.)

(N. B.—The date of decease was December 21st 1845. His Regiment was
34th Madras Native Infantry—A. L. M.)

Brick Monument—Marble Tablet.

Sacred to the Memory | of | Lieut.-Colonel LOUIS BRUCE, | who died,
31st Dec. 1845, | at Ferozpoor, | from the effects of a wound received |
at the | battle of Ferozeshah | on the 21st December 1845, | whilst gal-
lantly leading on the | 12th Regiment Native Infantry. | Aged 53 years.

Sandstone slab 7' x 2" 10' x 3".

Sacred | to the Memory of | Major ARTHUR WILLIAM FITZROY
SOMERSET, | Grenadier Guards and Military Secretary | to the Governor-
General, | Eldest son of Lord Fitzroy Somerset, | born 6th May 1816 |
and died of wounds received at the | battle of Ferozeshah, Christmas day
1845.—Maharajpore, Moodkee, Ferozeshah, (See page 5).

Plastered Brick Monument—Marble Slab.

Sacred | to the Memory of Colonel CHARLES CYRIL TAYLOR, C.B., |
H. M. 29th Regiment, | killed at Sobraon, | 10th February 1846.

*Brick Monument, covered with sandstone slabs, 8' x 4" x 3½—
Marble Tablet.*

Here lies | in the hope of a joyful resurrection | SIR ROBERT HENRY
DICK, | of Tully Mett, Perthshire, N. B., | MAJOR GENERAL | KNIGHT
COMMANDER of the Orders | of the BATH and of HANOVER, | KNIGHT of
the Austrian Military Order | of MARIA THERESA | and of the Russian
Order of VLADIMIR, | Colonel of H. M. 73rd Regiment. |

For his country | he fought and bled | in Egypt, at Maida, thro'out
the Peninsula | at Waterloo and in India. | For his valour and skill |
at Fuentes d'onor, Busaco, Salamanca and | Waterloo | he received two
Medals | and two honorary clasps, | Born | on the 29th July 1787 A.D. |
He fell | in the moment of Victory, | on the 10th of February 1846,
A.D. | while cheering on H. M. 80th Regiment | having led his Division
in the assault | on the entrenched camp of the Seikh at | Sobraon. |
Honoured and beloved he lived, | Honored and lamented he died. |

Brick Monument—Marble Tablet.

In Memory of | the following Officers of Her Majesty's 31st Regi-
ment | who fell in the actions of | Moodkee, Ferozeshah and Sobraon |
during the campaign against the Sikhs | in the years 1845-46 | and who
are interred at or near this spot, [viz:] —

Colonel Samuel Bolton, C.B. ...	18th December 1845.
Major George Baldwin ...	21st ditto "
Captain Wm. G. Willes ...	18th ditto "
Lieutenant I. R. Pollard ...	21st ditto "
" Henry Hart ...	18th ditto "
" John Brenchley ...	18th ditto "
" Wm. Bernard ...	21st ditto "
" C. H. G. Tritton ...	10th February 1846.
Ensign Wm. Jones ...	10th ditto "

| Also | Assistant Surgeon R. B. Gahan, H. M.'s 9th Regiment, |
attached to the 31st Regiment 18th December 1845.—

This monument | is erected by their brother | Officers to mark
their esteem.—

N. B.—Colonel Bolton died 4th January 1846 ; Major Baldwin, 30th Decem-
ber 1845 ; Captain Willes, 24th December 1845 ; Lieutenant Pollard's initials were
J. L. R. ; Lieutenant Brenchley died 19th December 1845 ; Ensign Jones was
dangerously wounded at Sobraon on 10th February 1846, and died some days
after. He (the last) was an Ensign just promoted from Quarter-Master-Sergeant.
Surgeon Gahan died 29th December 1845.—A. LEM.)

Brick Monument—Marble Tablet.

Sacred | to the Memory of | JOHN FRANCIS EGERTON, | late Captain
of the Bengal Artillery | and Deputy Assistant Quarter Master General |
of the Army, | who died at Ferozepore | on the 23rd of January 1846, |
from wounds received at the | battle of Ferozeshah | on the 22nd Decem-
ber 1845. | He was universally | respected by all who | knew him.

Sandstone Monument.

Sacred | to the Memory | of | Major HENRY DELAFOSSE, C.B. | Bengal Artillery, | Principal Commissioner of Ordnance, | who died | near Ferozepore, 3rd October | 1845.

Brick with Marble Tablet.

Sacred | to the Memory of | GEORGE MITCHELL, late Ensign of H.M. 29th Regiment, | who departed this life on the 18th of February 1846, | aged 36 years, | from wounds received in the action of Sobraon leaving | a widow and orphan child to lament his irreparable | loss. | This monument is erected by his sorrowing | widow as a small token of her affectionate love. |

(N. B.—Ensign Mitchell had just been promoted from Sergeant-Major—A. LEM.)

Sandstone with sandstone slab on top.

In Memory | of | R. BERESFORD GAHAN, | Assistant Surgeon, H. M. 9th Regiment Foot. | He was severely wounded at the battle of Mood-kee, | 18th December 1845, | and on the 29th of the month | at Ferozepore, | fell asleep in Jesus. | This last tribute of respect, | has been erected | by his attached and devoted widow | yet she sorrows not even as those | who have no hope. | For if we believe, that Jesus died and | rose again even so them also which sleep | in Jesus will God bring with Him.—I. THESS. iv., 11.

Sandstone Monument.

Sacred | to the Memory | of | Lieut. and Brevet Captain PATRICK NICOLSON, | 28th Regiment B. N. I., | who after serving the Government of India | most nobly and honorably during peace | in Military and Civil employment | in different parts of India; and during | war | in the campaign against the Coles, Anno Domini 1832, | and in the Afghanistan war, | fell mortally wounded in the day of Victory | whilst actively discharging a soldier's duty | (although at the time in Political employment) | at the battle of Ferozeshah, against the Sikh Army, | on the 21st December, A. D. 1845, | aged 37 years. |

This tomb is erected to his Memory by his brother | Officers and his immediate friends as a tribute of | their love and admiration for one who uniting the | warmest feelings of the heart with a powerful | judgment and great strength of mind, has endeared | his character in their remembrance.

(N. B.—The Christian name was Peter and not Patrick.—A. LEM.)

Brick Monument—Marble Tablet.

Sacred | to the Memory | of | Captain T. W. BOLTON, | and | Ensign G. A. ARMSTRONG, | of the 2nd Regiment Grenadiers, | the former died on the | 7th January 1846, | from the effects of wounds | received in the action of | Ferozeshahur, on the 21st December 1845, | and the latter killed in the action of | Ferozeshahur on the 21st December 1845. | Deeply regretted by their | brother officers.

(MURAL TABLETS IN ST. ANDREW'S CHURCH.)

Marble in wall to the north of the Altar.

SACRED TO MEMORY OF MAJOR ARTHUR WILLIAM FITZROY SOMERSET, Grenadier Guards, and Military Secretary to the Governor-General, eldest son of LORD FITZROY SOMERSET, born 6th May 1816, and died of wounds received at the battle of Ferozeshah, Christmas day 1845. Maharajpooor, Moodki, Ferozeshah (See above).

Brass in wall to the south of the Altar.

TO THE MEMORY OF MAJOR GEORGE BROADFOOT, C. B., 34th Regiment of Madras Light Infantry, who fell gloriously at the battle of Ferozeshah in the 38th year of his age; the last of three brothers who died on the battle fields of Asia. Political Agent for the affairs of the Punjab, acting as A. D. C. to the Governor-General in the battle. "Second to none in all the greatest qualities of an accomplished officer." (See above).

Also to the Memory of Major ARTHUR FITZROY SOMERSET, Governor-General's Military Secretary and A. D. C., to the Governor-General, who fell mortally wounded conducting himself with the hereditary valour of his race. (See above).

Also to the Memory of Major WILLIAM ROBERT HERRIS, of Her Majesty's 3rd Light Dragoons, A. D. C. to the Governor-General, whose zeal and intelligence were most conspicuous.

(N. B.—The surname was Herries and not Herris.—A. LEM.)

Also to the Memory of Captain WILLIAM HORE, 18th Bengal Native Infantry, Acting A. D. C. to the Governor-General. A very meritorious officer. (See above).

Also to the Memory of Lieutenant JOHN MUNRO, 10th Regiment, Bengal Light Cavalry. An officer of the greatest promise.

All of whom fell during the Sutledge campaign in their country's service, and whose imperishable reputation will be found recorded in the orders of the Governor-General.

THIS TABLET IS ERECTED BY LIEUTENANT GENERAL VISCOUNT HARDINGE,
A. D. 1849.

FEROZ-SHA-HUR.

(MISREWALLA.)

Also at 10 miles from Ferozepore to the east of the village of Misrewalla and within 200 yards of the road (to the south), is a monument within a walled enclosure. It carries the following inscription on a sandstone slab. It is in good order and will be repaired by Public Works Department.—A. LEM.

SACRED | TO THE | MEMORY | OF | Lieut. PETER COLNETT LAMBERT, |
3rd Troop, 3rd Brigade, | Horse Artillery, | who fell in action | at Feroze-
shah, | on the 22nd December 1845. |

(MUDKI, FEROZESHAH, ALIWAL, SOBRAON.)

Obelisks were raised on the battle fields during 1869-70. They are in good order with the exception of the one at Aliwal, which will shortly be rebuilt. At Mudki there are 3 tombs in the village without inscriptions; they are said to cover the graves of European soldiers.

At Ferozepore, at about 500 yards North North-East of the Memorial Obelisk, is a grave covered by a small pillar of brick in mud and enclosed within a dwarf wall. The villagers say it is the spot where Broadfoot was buried, but this is incorrect, as that officer was buried in Ferozepore cemetery in the presence of Lord Hardinge. In regard to this Major Broadfoot, R. E., (Retired) writes me in August 1891 as follows:

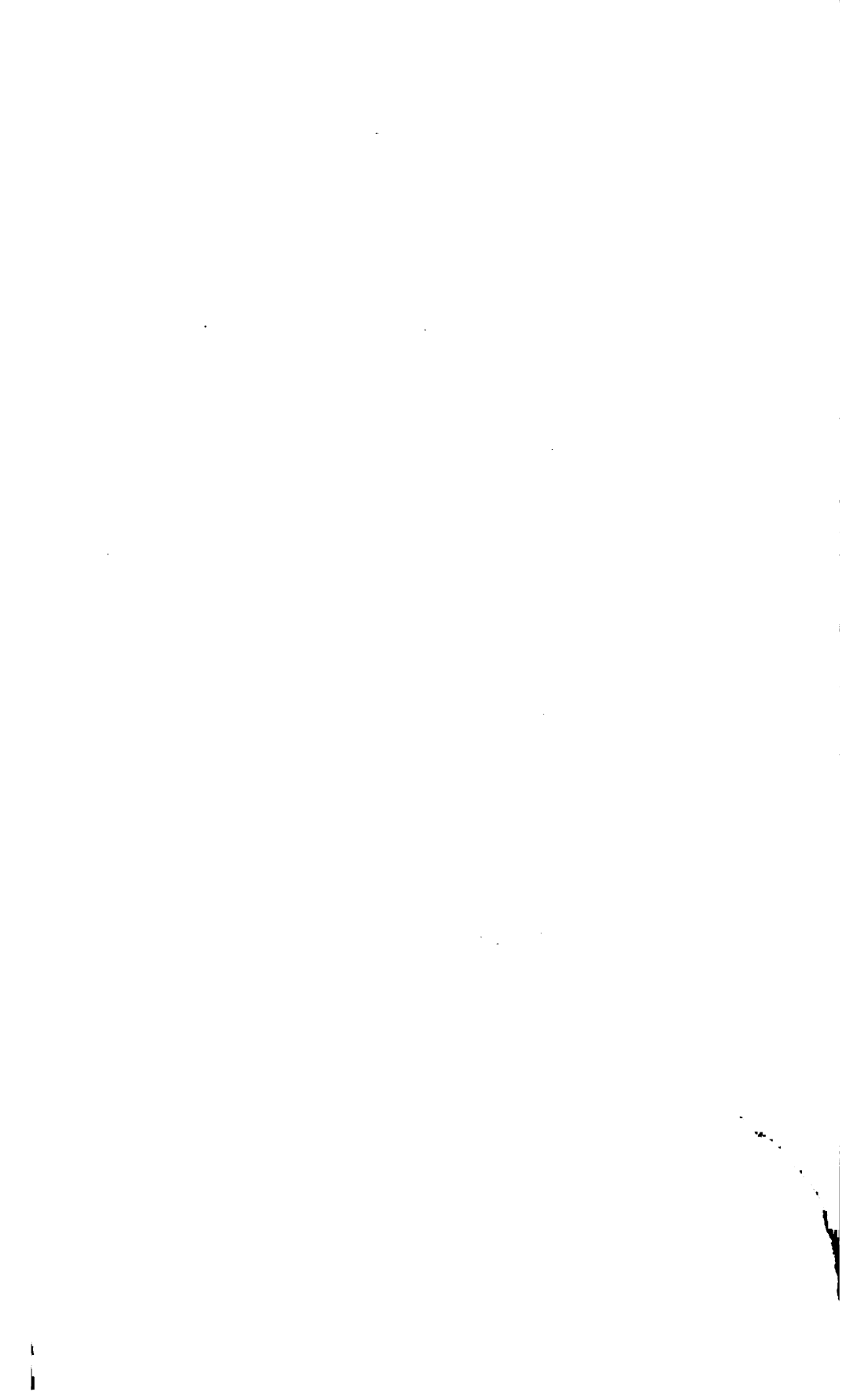
"I will now tell you a little about those graves which possibly may not be known to you. Sale was mortally wounded at Mudki and was brought into the Fort there, where he died. When the issue of Ferozshah was doubtful, orders were sent, in case of disaster, to destroy Government records; on December 22nd, when we took the position, orders were sent to bring them and the wounded on. Sale's body was brought on and the Dooly bearers laid it down on the field of Ferozshah. A shallow grave was dug in the intrenchment with bayonets and grass cutters' knives, and Sale was buried there in Lord Gough's presence. His body was afterwards exhumed and he was buried at Ferozpur. Broadfoot was killed about dark on December 21st. His body was brought in to Ferozpur on a camel, the other half of whose burden was Captain Hore. Broadfoot's Assistants, Mr. R. N. Cust, Edward Lake, and possibly others, made a coffin out of store boxes and others did the same for Somerset, Hore, and the rest. They were buried, if I recollect right, on Christmas Eve, and as the bodies were being carried out one of the coffins was found to be so light that it was opened and found empty. I think it was either Hore's or Somerset's body which was missing. It was found, placed in the coffin, and all were taken to the burying ground, Lord Hardinge and his Staff, including the present Viscount, attending. • • • Some day perhaps I may have the pleasure of seeing your sketch of the grave on the battlefield. I never heard that Broadfoot was temporarily buried there and am disposed to doubt it." • • •

The name on the tablet at Ferozeshah is given as Ferozeshah, the English name for the battle. The true name of the place is said to be Pheru-Shahr.

The date on the Aliwal tablet is 16th January 1846. This is incorrect, it should be 28th January 1846.

October 7th 1891.

A. LEM.



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THE SIBERIAN RAILWAY.

By N. A. Volschinoff, Colonel on the General Staff, (read before the Imperial Russian Geographical Society on 5th December 1890).

Translated by Lieut. G. F. NAPIER, 2nd Battn. Royal Sussex Regiment, Interpreter in Russian.

The first project of a railway in Siberia is connected with the name of Count Muravieff-Amursky, and arose almost immediately after the addition to Russia of the large region in the basin of the Amur river. Since that time (1857) various projects have arisen: some wished to construct a horse tramway joining together towns, or certain river basins; others again desired a line of rails right across Siberia.

In constructing a line many strove to attain the most varied results, without observing that these results were diametrically opposed to each other. This was principally owing to the want of accurate knowledge in St. Petersburg about Siberia. Russia has now possessed western Siberia more than 300 years, and eastern Siberia as far as Gorbitz about 250 years.

Amur was added to Russia over 30 years ago after being 200 years in the possession of China. The thickness of the population in Siberia depends on the length of time during which the different portions have been held, and also on the fact that all settlers passed from European Russia to Siberia, i. e. from west to east. But then it will be observed that the Amur and* Sea Littoral regions, which have become Russian comparatively recently and lie on the extreme east of Siberia, have rapidly made up for lost time, and now show little difference in the thickness of the population from the more western regions of Siberia.

For instance the population per square verst is as follows:—

Tobolsk Government	...	...	...	1.1 men.
Tomsk	„	...	...	1.6 „
Yeniseisk	„	...	...	0.2 „
Irkutsk	„	...	...	0.6 „
Trans-Baikal region	...	...	...	1.0 „
Amur	„	...	...	0.2 „
Sea Littoral	„	...	...	0.6 „

* Maritime Province.

These figures shew that the density of population in the Yeniseisk Government and the Amur region is identical, as also that in the Irkutsk Government and the Sea Littoral region.

If we remember that the Yeniseisk and Irkutsk governments have been held about 300 years, and the Amur and Southern Sea Littoral only thirty years, it must be admitted that the colonisation of these latter regions has been very successful.

Colonists for the Amur region must cross the whole of Siberia; hence 90% do not reach that place, but settle somewhere on the way. And those who get as far as the Amur region take from 2 to 14 years over the journey. To date, nothing has been done to facilitate the emigration by land from Russia to the Sea Littoral. About 2,000 go by sea every year, but the great expense prevents these numbers increasing. The cost of the journey for every full grown person is 90 rubles, and 45 rubles for every child under 10 years old. In addition to this there is the expense of the railway journey to Odessa. As against the above numbers 600,000 Chinese settled in Manchuria in 1889. The numerical relation of the Russian Sea Littoral is disadvantageous.

In Manchuria there are 10,000,000 inhabitants, and in the Russian Sea Littoral less than 100,000. The following facts help to shew the probable results of the proposed railway.

The output of gold during the year 1887 was as follows;—

Yeniseisk district.....	*226 puds.
Kansk and Nijni-Udinsk.....	22 „
Achinsk and Minusinsk.....	52 „

The whole of Siberia } ... 300 „
west of Baikal }

Amur district.....	362 puds.
Trans-Baikal.....	132 „
Olekminsko-Vitimsk	494 „

All east of Baikal..... 988 „

To this it is necessary to add, that the rich Yeniseisk-Olekminsk mines are gradually yielding less gold; while on the other hand the mines of the Amur region give a greater quantity of gold every year. Up to the present time more than 60,000 puds of gold have been obtained in Siberia, which equals 1,200,000,000 paper rubles. It is terrible to think of the riches that have been buried in the earth while obtaining these 60,000 puds of gold. It must be remembered that the average wealth of the gold worked in Siberia is about one zolovink (2·40 drams) to every 100 puds of auriferous sand, and that all auriferous strata, which appeared poor, were pitilessly shovelled out and thrown on the surface. As all this work is done by Siberian workmen, it is strange to hear specialists assert that there are no peasants in Siberia fit for navvies' work. All the gold contained in the strata, considered too poor to be worked profitably, is lost for ever.

* One pud = 36 pounds.

In view of the present price of bread, the thinnest of population, and the dearness of supplies for working the gold mines, one of the large gold mining companies in the Amur region considers it unprofitable to work those mines; in which the gold yield is less than 1 zolovink 32 doley (3·2 drams) per 100 puds of sand: while in the Ural district 25 doley (6·25 drams) per 100 puds of sand is considered a profitable yield. It is unquestionable that this great difference arises from the fact that the Amur region is cut off from Russia, that the local population is insufficient, and that bread and transport of necessaries are expensive.

On the Tomsk-Irkutsk line, without injuring the gold mining operations, 30,000 free workmen might be found; while in Trans-Baikal upwards of 15,000 might be engaged.

From China about 2,000,000 puds of "Bohea" and "brick" tea are annually imported into Russia. About half comes through the European frontier custom houses, and about half through the Irkutsk customs. The tea coming through the latter goes by two routes: (1) from Khankoi to Tian-Tsin, and through Mongolia to Kiachta; or (2) from the Khankoi Sea straight to Nikolaevsk, thence up to the Amur river and across Trans-Baikal. With the exception of 150,000 to 200,000 puds the whole goes by the first route. The transport via Nikolaevsk is about 1½ rubles per pud cheaper than by the other route, but owing to its uncertainty it is highly inconvenient.

The cost of transport across China via Kiachta is about eight paper rubles per pud, so that on the million puds imported, upwards of eight million rubles find their way into the hands of the Chinese, consequently on the railway being constructed several million rubles would be kept in the country.

To recapitulate, the colonisation is slow and irregular. The gold industry is carried on in a primitive manner and yields to the government far less income than it should, lastly the tea freight is paid to China instead of being kept in the country.

We will now proceed to the means of communication uniting Siberia with Russia at the present time.

The Volga, the chief artery of Russia, is connected with Siberia by the Perm-Tiumen railway. Nijni-Novgorod is connected with Petersburg by water, by which means over 70 million puds may be carried yearly at a cheap rate. From Nijni-Novgorod to the east, by the Volga and the Kama to Perm, goods may be carried to any extent at a cheap rate for about five months (while the rivers are open for navigation). This journey takes for passengers four days, and for goods 10 to 12 days, Perm is connected with Tiumen by the Ural railway: time for passenger traffic about 1½ days, for goods 10 days.

From Tiumen eastward to Tomsk there is water communication by the Rivers Irtish and Obi. Passenger traffic takes nine days, goods traffic 15 to 20 days. The rate of travelling on the Obi might be doubled. There are 64 steamers on the Obi, having a total horse power of over 4,000.

It has been calculated, that if the construction of the railway were commenced, five million puds the first year; and ten million the second

year might be carried from Tiumen to Tomsk at a cost of from 10 to 12 kopeks per pud the whole way.

A list of the steamers and barges, with their dimensions and steam power, is given in No. 125 of the Journal "Russkoe Sudokhodstvo," August 1890.

Turning to the next portion from Tomsk to Irkutsk, we find its total length 1568 versts,* a made road throughout, which, both in summer and winter, is in an extremely bad state, in spite of all the efforts of the local administration. This arises from the fact that the waggons, several hundreds in a string, with one driver to every five waggons, go one behind another in the same ruts. In rainy weather during summer the road becomes almost impassable. About four million puds of goods pass between these points, half each way: time taken from point to point 40 to 50 days.

Thus a driver going from Tomsk to Irkutsk and back covers 3,200 versts, and takes nearly half a year over the journey. Each horse and cart do not make the journey more than once a year.

About 80,000 carts and sledges, with 16,000 drivers, make the journey there and back every year, hence a large amount of provisions and fodder are available on the road, and many wealthy and populous villages have sprung up. Here settlements will often be found containing several thousand inhabitants, and extending in an unbroken line of buildings along the road for five and even seven versts. Average cost of carriage per pud, in winter two rubles, and in summer seven rubles, but the rates vary largely.

East of Irkutsk goods travel partly by the river Angara, and partly by the cart road to Baikal Lake, then across it in boats in summer and on the ice in winter, and in bad weather by the road round it. The next portion is from the south bank of the Baikal to Sretensk on the river Shilka.

All the settled population of Trans-Baikal has occupied two regions: on the west the lower portions of the rivers Khilka, Selengi Chikoya, and on the east the valleys of the Sugoda, Unda, Shilka, Nercha and, Gazimur. The whole of the middle portion of Trans-Baikal, from its northern to its southern boundaries, is a hilly desert region almost entirely unpopulated. The posting road leading from Baikal to Sretensk cuts this region into two parts; north of the road live only wandering tribes, to the south nomadic races. None of these people eat bread or feed their horses with grain. They are not engaged in agriculture, and have no supplies. Formerly the post and goods were transported from one nomad camp to another by the aid of these wandering races. After the occupation of the Amur country the demand for transport for travellers, and for the post and Government stores from Baikal to Sretensk began to increase, and Count Muravieff-Amursky had to establish along the road a chain of stages (for 440 versts between Verkhnei-Udinsk and Chita, being the portion passing through the desert belt). At the present time, after 30 years, the settled population along this

* Equal to about 1050 miles.

portion of the road numbers 3,400 persons of both sexes. On account of the soil and climate agriculture is not successful here. There are no stores of oats or bread. In 1888 there was a bad harvest, causing much distress, and the inhabitants refused to supply the troops and prisoners passing through. The Governor was only able to collect enough supplies to save the actual inhabitants from famine.

The same thing would happen in time of war, and the transport of large stores of grain for men and horses would have to be arranged for. Count Muravieff-Amursky at once recognised that the Amur river was the life artery of the newly annexed region, and that on the contrary Trans-Baikal was a formidable barrier between Russia and the Amur country. He saw clearly the danger and disadvantage of not having overland communication between Russia and the Amur country, and strongly advocated, 30 years ago, the construction of a line of railway between Irkutsk and Chita.

The snowless region in Trans-Baikal makes the transport of goods extremely difficult and expensive. The driver has to carry his sledge on a cart, and then his cart on a sledge, and this change has to be made almost at every station. Under such conditions it is impossible to expect development of transport.

This snowless region is an obstacle to communication between the Amur Provinces and Russia, and an obstacle to the colonisation and development of the whole of the young, but rich, Amur region.

In the next portion, the basin of the Amur, float at present 45 steamers with a total steam power of 2,800 horses. Steam navigation on the Amur has only existed 30 years. Freights are excessively high, and the steamers are not suited to the conditions of the river; but all this will be changed when the Amur river is accessible for transport purposes from Vladivostok in the east, and Irkutsk on the west. New steamers, in suitable numbers and of suitable design, could be built in a year at any ship builders and despatched to the Amur viâ Nikolaevsk.

The next portion is from the Graftskaya settlement to Vladivostok.

Communications at present are as follows:—In summer by steamer from Graftskaya up the Ussuri to the junction of the river Sungaria; then up the latter river to the Khanka lake; thence across the lake to the settlement Kamen-Riboloff; thence to Vladivostok by road is a distance of 200 versts. The Khanka lake, Sungaria river, and the upper part of the river Ussuri present many obstacles to free and rapid communication. The level of the Khanka lake has fallen seven feet in 28 years, and in the last year nearly a foot. As a result of this the Sungaria river, flowing out of the lake, has silted up considerably. For the first three versts its depth does not exceed two feet. This necessitates either having barges on the Khanka lake drawing that amount of water, or else the trans-shipment of the merchandise at the entrance to the Sungaria river. In addition to this, the frontier river Sungaria, flowing through marshy ground, makes a number of sharp loop-shaped bends, and a steamer or barge which cannot turn sharply, continually runs aground.

The upper portion of the Ussuri river is also unsuited to navigation ; here there are a number of shoals, making steam navigation on the river utterly impossible during the dry season. At this time communication between Vladivostok and Khabarovka is only possible by sea via Nikolaevsk. Formerly it existed from Ussuri to Kamen-Riboloff, via Turg-Rog in Chinese territory, skirting the north of the Khanka lake. This route has now been closed by the Chinese. The journey from Vladivostok to Khabarovka is very difficult, and only possible by the telegraph cutting.

The Khanka lake lies in a large flat and marshy basin ; the whole of the ground east of the lake to the foot of the hills being one continuous marsh, which, although not very deep, is none the less impassable either on horseback or on foot. The region presents an inaccessible wilderness : for two hundred versts there is not a single village or settlement.

It is useless to expect that settlers will drain these marshes, and settle here, when in the Ussuri region there is such an abundance of good land and so few settlers. Hence a causeway from Grafskaya to Vladivostok would be of little use, as for the development of the means of transport to any extent the colonization of the region is of the first importance.

To sum up what has already been said :—

Vladivostok and the whole of the southern Ussuri region are completely cut off, not only from European Russia, but also from the whole of the Amur region. All the western half of this region, lying in the basin of the Amur river and its tributaries, is separated from Irkutsk and the whole of western Siberia by the Baikal Lake and the snowless, little populated belt passing through the centre of Trans-Baikal. Trans-Baikal and Irkutsk are separated from western Siberia by a hundred and fifty miles of forest road.

Further to the west, the basin of the Obi river is connected with the Volga, and hence with all European Russia, by the Ural railway.

Since the opening of China and Japan to trade, the importance of Vladivostok, at the gates of China, has immensely increased, and not only England, but all the powers, look on it with envy. The Chinese papers are full of English articles, proving how weak the Russians are in the east, and how useful the southern Ussuri region would be to China.

There is no doubt, that as yet China has not succumbed to the evil counsels of foreigners, but there is also no doubt, that such a state of affairs cannot continue long : only a spark, a single misunderstanding is necessary, in order to spoil the ancient peaceful relations of Russia with China.

Besides, Vladivostok presents a dainty bit for naval powers, here it would be possible to wound Russia without an immediate retaliation. As Sevastopol, separated from Moscow by a distance of 1,500 versts, was the point selected for attack by hostile powers, so Vladivostok will certainly be the scene of operations selected by our European enemies. However the railway is constructed, it must be constructed

quickly, so that within six years Vladivostok may be connected with Russia by a reliable and convenient route.

In deciding on the question of a continuous uninterrupted railway across Siberia, it is first necessary to decide clearly as to its object.

If we look at a map of Russia we are at once struck by the network of huge rivers flowing north and south, and by the great extent of Siberia from west to east.

It is necessary to draw a line, which will mark the boundary of remunerative agriculture, and it will at once be apparent where and why it is necessary to construct a continuous Siberian railway. North of this line are places to which a railway would be of no use: this is the region of the fur-trappers and natives. South of this line lies the belt, which in the future will carry off the superfluous population of Russia.

The aim of a large uninterrupted line across Siberia is not to develop agriculture and gold mining, but rather to remove the injurious influences caused by the enormous distances, in order to knit together the whole of this long and narrow belt, to draw the Pacific Ocean closer to European Russia, and to unite the rivers intersecting the fruitful portions of Siberia. If this could be accomplished in six years, the chief condition would be fulfilled, *viz.* the necessity of guaranteeing the Imperial interests of Russia on the shores of the Pacific Ocean. If such a railway could be constructed, which could carry goods at a tariff of one kopeck per 50 versts at a rate of 30 versts per hour, a huge amount of traffic would be attracted, and an impulse would be given to Siberia.

To turn to the data on which the plans have been founded.

In 1887-89 three parties of engineers made surveys of the portions Tomsk-Irkutsk; Baikal—Sretinsk, and Graftskaya—Vladivostok; and also of the portion around lake Baikal from Irkutsk to the station Mysova. The following are the principal results of the surveys.

The Tomsk-Irkutsk line, 1,568 versts in length. Near the present high road, 621 versts from Tomsk to Achinsk, and from Ukhtinsk to Irkutsk are fairly level, steepest gradients 0.008, sharpest curve 250 sagens (583 yards). The remaining 947 versts, mountainous, steepest gradient 0.015, sharpest curve 150 sagens (350 yards). Cost, 60 million rubles, or 40,000 per verst.

The line round Lake Baikal, 293 versts long, steepest gradient 0.012, sharpest curve 120 sagens (280 yards). Cost, 22,800,000 rubles, or 78,000 per verst. This includes a tunnel 1890 sagens long (4,410 yards), which shortens the line by 30 versts.

The Trans-Baikal line, from the station Mysova to Sretensk on the river Shilka, 1,001 versts in length, the whole line level, except 27 versts on the descent from the Yablonoff ridge to the valley of the river Chita, when there is a gradient of 0.012 and a curve of 200 sagens (467 yards). Cost, including wooden bridges and retaining walls on both sides, 43,000,000 rubles, or about 43,000 per verst.

The Ussuri portion, length from Vladivostok to Graftskaya settlement, 393 versts, level. Probable cost, 23,000,000 rubles.

The remaining portions have not been surveyed, but it may be presumed that the portion between Cheliabinsk and Tomsk, and that

along the river Obi will be considerably cheaper, and will be level throughout.

The probable cost of the entire line from Mias to the Obi has been calculated by a special commission at about 28,000 rubles per verst, or 50,000,000 rubles for the whole line. Length of line from Mias to the Obi, including branches to Tomsk and Omsk, about 1,630 versts.

The eastern portion from Sretensk to Khabarovka is a direct continuation of the Trans-Baikal railway. It has not been surveyed, but, from information obtained from local inhabitants &c., it is evident that from Sretensk to Chernáyeva, a distance of 700 versts, the railway would have to follow the left bank of the Shilka and Amur rivers, and would not leave the valley of the latter. Probable cost 45,000,000 rubles or 62,000 per verst. East of Chernáyeva the railway leaves the valley of the Amur and goes straight to Khabarovka. In this portion, two important watersheds have to be crossed, *viz*: those between the Zea and Burea, and between the Burea and Kur rivers flowing into the Amur below Khabarovka. Length about 1,300 versts. Probable cost 60,000,000 rubles, or 50,000 per verst.

From Khabarovka to Grafskaya settlement, 400 versts along the valley of the Ussuri river, probable cost 24 million rubles.

All calculations of cost include rails and embankment.

The length of a continuous line from Mias to Vladivostok would be 7,300 versts, probable cost 340 million roubles.

The length of a line between the portions Tomsk to Irkutsk, Baikal to Sretensk, and Ussuri to Vladivostok, about 2,950 versts, cost 122 to 127 million rubles.

As regards the time required for construction, taking 150 versts per annum, which is the quickest rate reached in European Russia, we find that, working from one end to the other, the following time would be required for each portion. From Zlatoust to Cheliabinsk two years; thence to the Irtysh, working at both ends, five years, including one year for surveys. From the Irtysh to the Obi, working at both ends, four years, including one year for surveys. From the Obi to Achinsk, 400 versts, three years. From Achinsk to Krasnoyarsk, two years, and thence to Irkutsk, transporting rails by the Yenisei, six years. The line round the Baikal lake, four years, and this can only be commenced after the completion of the Tomsk-Irkutsk portion. The Trans-Baikal portion, working westward from Sretensk, would take six years. The portion from Sretensk to Khabarovka might also be finished in six years, including two years for surveys. From Khabarovka to Vladivostok would take four years.

From the above it is apparent, that the time required for construction depends on the number of points at which work is simultaneously begun.

Thus, commencing at Zlatoust and working towards Vladivostok, the entire line would take 40 years to construct, and if advantage were not taken of water communications for the transport of materials, 80 years would be required. Commencing from both ends simultaneously (Zlatoust and Vladivostok), the road might be completed to Irkutsk in

six years by working simultaneously from Cheliabinsk, Omsk, Tomsk, Achinsk, and Krasnoyarsk; and in 11 years if the railway east of Krasnoyarsk were only commenced on completion of the line to Achinsk. If to 11 years we add the 6 years necessary for the construction of the Trans-Baikal line, it will be seen that 17 years would be required to connect the Amur country with Russia. And if it is considered necessary to complete the line round the Baikal Lake before the commencement of the Trans-Baikal line, then 21 years will be necessary. If commenced from Zlatoust and Vladivostok simultaneously in 11 years, two lines would be completed, each 3,000 versts long. Both lines would rest on a little populated region, and would be completely disconnected by the almost impassable belt of the Trans-Baikal region.

Under such a system Vladivostok would be connected with Russia too late, and this might cost Russia as dearly as the delay in the construction of the line from Sebastopol to Moscow did. Simultaneous construction from the two ends could only be useful in order to gain time for surveys of the portions Mias-Obi and Obi Achinsk, and Sretensk-Khabarovka-Grafskaya. But on the completion of the surveys it would be necessary to commence work simultaneously from several points.

In this manner the whole line might be completed in six years, with the exception of the line round the Baikal Lake, or including it, in 10 years. Of course such a work could not be carried out on the balance of the surplus budget of each year. Grants of 100 million roubles per annum for the first two years, of 50 million per annum for the second two years, and of 25 million per annum for the remaining two years, would be necessary. If Russia cannot incur these expenses in the given time, it would be better not to attempt a continuous line, but instead to connect the river basin. Commencing the Tomsk-Irkutsk line from Tomsk, Achinsk, and Krasnoyarsk, it might be completed in six years. Within the same time the laying down of the Trans-Baikal and Ussuri railways might be completed, and in this manner, in six years Siberia and Vladivostok would have steam communication with Russia.

The three portions between the rivers are the minimum, to reduce which would be highly injurious to the Empire. Each of the portions would certainly be advantageous, but taken by itself, it could in no way solve the principal problem.

The Tomsk-Irkutsk line certainly passes through the most populous region, and the profits from it would be the greatest, but the object of a Siberian railway is not to at once draw a new revenue from Siberia, but rather to guarantee as quickly as possible the Imperial interests of Russia in the east, and to facilitate the development of the whole of Siberia and the Amur region. The Amur region will remain cut off from European Russia until the Trans-Baikal line is constructed.

The cost of carriage of one pud of merchandise from Russia to Irkutsk, and thence to the Misova settlement; or, from the other side,

from Russia to Sretensk through the Suez Canal would be as follows:—

Odessa-Zlatoust.....	10 Kop.
Zlatoust-Irkutsk, 3,400 versts at one kop. per 50 versts.....	68 „
Transshipment.....	1 „
Across the Baikal Lake.....	10 „

Total..... 89

Odessa-Vladivostok.....	30 Kop.
Vladivostok-Grafskaya (by rail).....	8 „
Grafskaya-Sretensk	80 „
Two transshipments.....	2 „

Total ... 1 R. 20 Kop.

Until the construction of the Ussuri line, loads for the Amur would go via Nikolaevsk. The freight of one pud would be as follows:—

Odessa-Nikolaevsk.....	60 Kop.
Nikolaevsk-Sretensk.....	80 „

Total ... 1 R. 40 Kop.

Therefore the freight of one pud to Sretensk via Suez would be 30 to 60 kopecks dearer than from Zlatoust to Misova by rail.

It has been calculated, that for the construction of the Trans-Baikal line, it would be necessary to procure from Russia rails and other material, cement and rolling stock to a weight of 4,200,000 puds, therefore, commencing the Trans-Baikal railway from Sretensk, it would be necessary to pay for freight from 1,680,000 to 2,400,000 rubles, calculating freight at 40 to 60 kopecks per pud. But if the railway were begun between the Obi and the Amur simultaneously from both ends, the whole would be finished in 6 instead of 12 years, and the increased revenue from the Tomsk-Irkutsk line would more than cover the payments for freight. Besides, every kopeck expended on transport on the Amur would assist the development of the steam navigation on that river, and on the other hand every pud brought by railway at a tariff of one kop. per 50 versts would add to the wear and tear of the rolling stock and rails, without contributing to the earnings of the railway. The construction of the Tomsk-Irkutsk line alone would not change the route of the tea trade. Tea would be sent across China as before, and the Russians would continue to pay the Chinese some 10 million rubles per annum. In addition to this the whole of the Amur region would continue to be cut off from Russia as before. By constructing the Tomsk-Irkutsk line alone, as being more remunerative, Russia would risk having to pay as dearly as she did in 1854, for constructing the more profitable Warsaw line, instead of that from Moscow to Sebastopol. In a word, by the construction of the Tomsk-Irkutsk line only one span, of the bridge across the abyss between the Obi and the Amur would be completed. The construction of the Trans-Baikal and Ussuri lines would also be only a half measure, but these two lines would make a change in the

route of the tea trade. All the tea, at present going to Irkutsk via Kiachta, would be sent via Vladivostok, the Amur, and Trans-Baikal. Finally, the Ussuri line, taken by itself, would not connect Vladivostok with Russia, but it would connect it with the water ways of the Trans-Baikal and Amur provinces, in which are concentrated all the reserves of the Trans-Baikal and Amur Cossacks and all the military supplies of the Amur military district. It would secure the furnishing of the entire fleet, as well as of the land forces concentrated in Vladivostok.

Trans-Baikal furnishes yearly more than 150,000 large cow hides merely for the covers of tea chests, and supplies the Irkutsk Government with wheat. In a word, the Ussuri line would make Vladivostok a secure port, and would guarantee it against any attempts by foreign naval powers.

The economic significance of this line is comprised in the following:—(1) it would connect the vast Amur basin with a port open for nine months in the year. At present this basin only communicates with the ocean via Nikolaevsk, which is only open for navigation from the end of May to October, that is four and half months in the year. (2) It would shorten the water journey of all commercial freight going to the Amur and vice versa by 2,000 versts, and would obviate the inconvenient and expensive transshipment, into boats drawing less than 12 feet of water, on entering the shallow Amur estuary. Owing to this the expense of freight is considerably increased. From Odessa to Vladivostok it is possible to charter a vessel at 30 kopecks per pud, whereas to Nikolaevsk it is necessary to pay exactly double, viz. 60 kopecks. In addition, the Ussuri line would obviate the payment to foreigners of the extra insurance rates for the dangerous navigation in the stormy Gulf of Tartary and in the little known estuary of the Amur river.

Only two solutions are possible of the question of a Siberian railway, either to construct a continuous line across the whole of Siberia, or else to construct lines between the rivers.

In either case it is imperative to commence operations simultaneously at all points to which it is possible to forward the materials by water.

The construction of a continuous line would cost about 340 million rubles in the course of five years.

If such a grant of money is impossible, then there is nothing more to be said, and the construction of the line between the rivers should be commenced without losing another hour. This work would require an expenditure of 40 million rubles each for the first two years, and of 15 millions for each of the remaining three years.

Should this expense appear inconvenient, or should it be considered impossible to commence construction at more than one point, then there is no question as to which should be chosen. If it is impossible to connect Vladivostok with Russia, then it is imperative to connect it with the Amur region.

If you cannot save a drowning man by giving him your arm, at least throw him a life-preserver.

The Ussuri line is necessary, not only for commercial reasons, but also in order to save Vladivostok, to save Russia from a repetition of the heavy trials of the Crimean War, from the payment in Russian blood for the delay in the construction of an indispensable railway.

A COMPARISON

Between the Medical arrangements for the expeditions, Lushai 1871-72, and Miranzai 1891, with reference to the important bearing of the subject upon the efficiency of the troops and followers employed in each case.

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Those who remember the Crimean War will remember also the storm of public indignation roused by the letters of Dr. W. H. Russell describing the terrible sufferings of the troops due to the complete collapse of all the departments of the army, commissariat, transport and medical alike. "The Caukers of a calm world and a long peace had led to a degree of inefficiency which though overcome in the end by the admirable endurance of men and officers and an expenditure which is felt to this day, cost us many thousands of valuable lives which would undoubtedly have been saved by better organization. Fortunately for us, our enemies were no better organized, or it might have gone hard with us, and our friendly allies, whose sufferings were even greater than our own although less generally known and talked about.* Fortunately too we are a political people, and popular indignation having upset the ministry supposed to be responsible for the blunders, insisted on the appointment of a Royal Commission which in its turn originated the great modern improvements which have for their aim the perfecting of our army as a fighting machine. The rapidity with which campaigns are now conducted, leaves no time for preparation after a declaration of war, and the army which is best organized has *cæteris paribus* the best chance of success. Although in the stress of battle providence may still favour the big battalions, these are comparatively useless unless they can be properly fed, promptly moved, and *kept in health*. The importance of this last factor is only now beginning to be fully recognized, and a neglect of sanitary precautions has many times in our military and naval history led to grave disasters, while it has come to be regarded as a natural law that in every campaign disease carries off far more victims than the assaults of the enemy. Medical science has protested against this doctrine but has been until lately like wisdom crying out in the streets, no one regarding; and the medical department has time after time had to bear the blame, after having had its recommendations ignored or neglected. The lessons of the past have borne fruit, however, of recent years the department has been given a comparatively free hand, the principle being admitted that where responsibility rests the initiative must rest also.

The result has been in peace a reduction of the death rate among British troops in India from 69 to 12 to 16 per 1000 per annum, a

* The French lost in the Crimea 20,240 by the fire of the enemy and 75,375 from disease.

saving of some 3,500 valuable lives yearly in India alone, to say nothing of an enormous amount of non-fatal sickness. The experience of other countries has been similar. "*Prenez bien garde*" says the Great Napoleon *que mes troupes ne soient pas placées dans des lieux malsains* but this advice addressed to Generals unschooled in sanitation, bore little fruit; and the French armies withered away from disease rather than from battle, great as their losses in action were. Mention has already been made of their sufferings in the Crimea. But the medical department was a mere branch of the intendance, the doctors were powerless, and when the war with Austria followed the Crimea the complete failure of the medical arrangements due to the neglect of the advice of the sanitary department was a considerable factor in the premature peace which astonished Europe. The greater part of the surgical equipment was left behind, and as a consequence many thousands of French wounded were left unattended for days. Speaking of these things in his book *De la mortalité dans l'armée* published early in 1870, M. Chenu director of the medical department pointed out that in spite of experience and the repeated protests of medical officers the system remained unchanged, and that were war to break out again the gravest disasters were to be anticipated for France, a prophecy which a few short weeks were amply to justify.* At the beginning of the great war in America the medical department of the little standing army was quite inadequate to cope with the sickness of the large armies required. But the common sense and practical sagacity of the people were equal to the occasion; and the sanitary commission, or purely voluntary organization which at an expense of many million dollars followed close on every column with its ambulance and comforts, organized its own transport, provided hospital trains, and fleets, and so managed matters that even in the darkest days of the war the sick and wounded were almost always promptly and properly attended to, still lives in the grateful recollection of the American people. The unavoidable miseries and sufferings of war are necessarily great, the avoidable miseries and sufferings have hitherto been many times greater, and while seeking to alleviate the one, the medical department hopes in time to altogether abolish the other. The military authorities have come to see that to be efficient fighting machines soldiers must be kept fit and well, that the prevention of disease is better than its cure, and that, a system which aims at general efficiency though more expensive at first is in the end more economical than one which seeking to save money spoils the ship for want of a ha'p'orth of tar.

There are therefore two great ends kept in view by the medical department of an army in war, (1) keeping the men in health, (2) attending them when sick or wounded, to which may be added, (3) sending them back from the front as quickly as possible, so as to avoid cumbering the hospitals with useless men who consume food and employ transport required elsewhere, and one of the great advances in modern military

* The French statistics of 1870-71 do not discriminate between cases due to the enemy and those from disease, but the deaths are given at 138,871, and the admissions to hospital at 470,521.

medicine is the recognition that questions for food clothes and transport are doctor's questions; and that physiology is a better guide than so-called common sense. A commissary general finding that men could not eat 2lbs. of rice or wheat, and rising to the fact that transport would be saved by reducing the ration, proposes it should be fixed in future at 1 lbs. 8 oz. The physiologist steps in and shows that the men could not eat it because it was unaccompanied by the condiments to which they were accustomed, and thus palled upon and disagreed with them; and statistics showed by a heavy avoidable mortality that the physiologist was right. Our latest scientific expedition to the Arctic circle failed of success mainly because difficulties of transport caused lime juice to be left behind on the sledge journeys, although repeated experience had shown that without it scurvy was certain to develop. The primary importance of keeping men in health being thus recognized the authorities both in peace time and on the breaking out of war are most anxious to adopt all reasonable measures to secure this end. They are however naturally desirous to secure it as cheaply as possible and are specially and rightly jealous of new suggestions which savour of theory, and have not been proved. There are also the respectable traditions that soldiers should not be coddled, and that the hardships of war should be borne without murmuring. In this medical officers will agree with their brethren of all departments; they only strive for the avoidance of *unnecessary* hardships which experience has shown to limit the usefulness of the fighting machine. It has happened over and over again that on the conclusion of a successful campaign, difficulties and dangers which may have imperilled its success are tacitly ignored. Our arms have been successful, and it is ungracious to complain. Mutual congratulations efface the memory of the difficulties, and the dangers are forgotten to reappear next time unaltered and unremedied. The principle is a dangerous one, and had much to do with the collapse of the French armies when a great strain fell on them, but it is by no means confined to the French. It is perhaps the more dangerous because it merits respect in many ways and because croakers are looked upon with suspicion, as troublesome or even as unpatriotic. There is a wide difference however between grumbling because of personal hardship or discomfort and showing how these may be avoided by others in the future, and unless defects and shortcomings are freely pointed out to the authorities they cannot be remedied; a false security and satisfaction are engendered, and when war is undertaken as by an Ollivier with a light heart, it is found that more important things than gaiter buttons are wanting.

During a campaign difficulties are to be trampled on and impossibilities ignored, but the campaign over and reported on, they should be fully discussed so that all efforts may be made to prevent their recurrence. In this way only are progress and improvements possible, and it is interesting to note how in recent expeditions the experience of the past has been utilized with most excellent results, although there is still room for improvement. The scope of this paper does not contemplate a description of the changes in the medical department, which

has as most of our readers know, been entirely remodelled and reorganized since the Crimean break down, but the difference in method between the old regimental and modern field hospital systems will be illustrated in the following comparison of their working as exemplified in the Lushai campaign of 1871-72, and the late expeditions on the Samana. The contrast is startling and shows what immense advances have been made in recent years and may be of interest also as showing the arrangements now in force for the care of troops and followers in time of war.

The expedition of 1871-72, undertaken to punish the Lushais for head-hunting raids within our territories on the borders of Kachar and Chittagaon, was in many ways a novel one, and the most thoughtful care was given by the Government of India and the military authorities to ensure its success. The country was known to consist of a continuous succession of steep hills covered with densest jungle, destitute of roads and entirely unknown to us. It was supposed, and the supposition was correct, that every ounce of food would have to be carried, and it was known that we should have to march "far into the bowels of the land" subject to all the impediments that nature and the ingenuity of the enemy could devise; water carriage was available as far as Sipai Mukh for the left or Kachar column, which will alone concern us, but beyond that coolies had to be almost entirely relied on, although a number of elephants were sent up. A fleet of country boats was collected at Kachar, a corps of 1924 Panjabi and Hindustani coolies was organized and sent from Calcutta, and another of 840 hill coolies was raised at Darjeeling, while a local corps of Kuki coolies was got together at Kachar. In order to keep them in health an issue of free clothing consisting of a blanket, a woollen coat, a pair of shoes and flannel leg bandages was sanctioned for each, but for some reason was never given to the Kuki coolies. A free ration sufficient in quantity was laid down, but the widely different food habits of the various classes of coolies employed was not sufficiently understood, rice was frequently issued to flour eaters, and flour to rice eaters, the local custom of fish eating was ignored, and the supply of condiments, vegetables and other adjuncts by which the natives vary the monotony of an otherwise unchanging diet was during the first six weeks quite insufficient, if not entirely wanting.

The fighting men numbered some 1800 and there were about 350 followers in addition to the coolies. Supplies for all had to be carried on the heads of the porters, beyond Sipai Mukh. Starting on this footing the force proceeded to cut its way in the more literal sense through the jungle. The country is thus described by the principal medical officer late Dy. Surgeon General Buckle C. B., "Separating the succession of hills are tortuous ravines, water courses and swampy hollows. The hill sides are covered to their summits with masses of vegetation, forest trees, bamboos, wild plantains, creepers, ferns and parasitic plants are matted together in a tangle of impenetrable jungle; throughout the night till late in the day this sea of jungle is shrouded in a mass of vapour: every article exposed is saturated with wet, and the dew pours from the trees like heavy rain." Every yard of road for about 110 miles had to be laboriously hewed with axe and kukri, the hill

sides were exceedingly steep, the ravines between the ranges so narrow that the road was never level, and almost always slippery, work was incessant, and became more and more arduous as sickness increased and devolved more work on those still equal to it. Supplies of food were not always available, and the ration had to be reduced; the men were constantly exposed to great vicissitudes of temperature, and though the troops who had waterproof sheets managed to protect themselves, the bulk of the followers and coolies were wet through nightly by the heavy dew. The resistance of the enemy was not very formidable although a considerable number of casualties occurred. The exact number cannot be ascertained from the medical reports, which show seven men killed in action and three as dead from wounds, but do not give the number of the wounded, and take merely incidental notice of a number of elephant drivers killed and wounded at Sipai Mukh. From a military point of view the expedition was a complete success, the enemy was severely punished, the captives recovered and the fines imposed duly paid;—but there can be no question that the chain was strained at times nearly to breaking point, and that success obtained through the strenuous efforts of all concerned was terribly dearly bought. The statistical results are nowhere clearly tabulated, the strengths nowhere accurately given, and no dates are fixed either for the beginning or the end of the campaign, so that it is very difficult to get out figures to compare with those of more recent expeditions, what figures there are, however, are very significant, taking the strength of the troops at 1800 and the duration of the campaign at five months, the actual campaign lasted less than three, they gave 2453 admissions and 89 deaths; being at the rate of 3268 admissions and 120 deaths per thousand of strength per annum. The Panjabi and Hindustani coolies who are noted in the report for their “comparative immunity from disease,” had a strength of 1924 with 113 deaths, equal to an annual ratio of 160 per mille or 16 per cent! The hill coolies lost 257 out of 840, or at the appalling rate of 717 per thousand per annum. Only one of these men was killed in action, two were drowned, but 201 of the deaths occurred prior to their joining the column in January 1872. If we omit these they lost 50 men out of 639 in three months or at the rate of 313 per thousand per annum, nearly one in three. The strength of the Kuki coolies is nowhere given, nor is that of the boatmen. They are debited with 88 and 32 deaths respectively, while followers are put down at 11, but in all these cases the numbers are understated for many died out of hospital in the jungle.* The total of these figures, all of which are taken from the official reports is 584, though in an abstract at the end of the report the deaths are put at 309 only. This discrepancy appears to be due to the exclusion of coolies who died before joining the column, and of the Kuki coolies and there can be no doubt that the larger number terrible though it is, is below the truth.†

* The writer can testify to at least 15 additional deaths not included in the official returns.

† The strengths given are not mean strengths, as they should be for statistical purposes, but the maximum strength at starting, so that still higher death rates would be worked out from the real strength if available.

Before going on to explain this frightful mortality, let us take the figures for the two Samana expeditions of 1891, the statistics of which are it is believed complete and trustworthy. In the first there was no fighting, but the climatic conditions were extremely trying; constant rain or snow with intense cold, and the work of both troops and followers exceedingly hard. Yet the total admissions among the troops were only at the rate of 574 per 1000 per annum and the deaths 9·57, while an average strength of 2345 followers had 573 admissions and only 4·09 deaths per 1000 per annum. Only five sepoy and one follower died in all. In the second expedition there was some sharp fighting, but including all losses at the enemy's hand, the death rate of the force was 16·89 for troops, and 18·76 for followers per mille per annum. Exclusive of the casualties of war, the rates from diseases were 4·58 and 11·66 respectively. These figures are focussed in the following table:—

	Strength.	Total deaths.	Ratio per 1000	Deaths from disease.	Ratio per 1000	Remarks.
Lushai Expedition.	Troops	89	119·83	80	106·65	88 deaths among Kuki coolies, 32 among boatmen, and 11 among followers are omitted; the strength returns not being available, or the rate of deaths incomplete.
	Hindustani & Panjabi Coolies ...	113	160·95	113	160·95	
	Hill Coolies	251	717·12	250	712·25	
	Total	453	238·21	443	232·95	
1st Miranzai Expedition.	Troops	5	9·57	5	9·57	
	Followers	1	4·09	1	4·09	
	Total	6	7·83	6	7·83	
2nd Miranzai Expedition.	Troops	18	16·89	5	4·58	
	Followers	8	18·76	5	11·66	
	Total	26	17·42	10	6·65	

+ Mean daily strength.

* Maximum strength at starting.

What then were the causes of this enormous difference? To what was the great mortality of the one, and the insignificant death rate of the other expeditions due? What lessons do they teach us for the future? What to aim at, what to avoid? The reply is simple, and may be expressed by the scientific formula "non-conformity to environment" in the one case, "conformity to environment" in the other. Had the arrangements for the Lushai campaign been as perfect as those for the Miranzai, the deplorable amount of suffering and loss would have been saved. Had the latter been conducted like the former the death rates would have approximated too. In these remarks no reflection is intended to be cast on any one. Government based the rates for the general conduct of the first expedition on previous experience and traditions, and on the best advice available, every officer with the force used his most earnest endeavours to carry out orders and remedy defects. The country was unknown and the calculations as to regiments proved miserably inadequate, but the calculations were made in good faith on the best information available, and the very proper desire to do things as cheaply as possible, led in the end to a great extra expenditure both in money and life.

Nature is inexorable and shows no mercy to those who wilfully or ignorantly break her laws. In the Lushai campaign every law of hygiene was outraged, and the figures given are the measure of nature's revenge. Men, overworked to their utmost power of endurance, were at the same time fed with unsuitable food, often of bad quality and insufficient quantity, they were exposed with insufficient clothing to great diurnal vicissitudes of temperature, and left without shelter, exposed to a nightly dew "pouring from the trees like heavy rain" while all the arrangements for their treatment were quite insufficient, although the medical department of that day thought the provision ample, and it might possibly have sufficed had there been less sickness.

The main cause of all the trouble was the fact that everything had to be carried by coolies, and that in a hilly country 40 lbs. was considered a full load for a cooly, as he had to carry his own food, it is obvious that when the force reached its furthest point, that available balance carried for service purposes was very small, and it was thus necessary to over-work or over-load the men to get up sufficient supplies. Each coolie had of course to carry his own clothes, cooking pots, bedding &c., in addition to his burden of 40 lbs., and it may readily be imagined that he could not carry much. One blanket was no protection whatever against either cold or dew, the food issued to them was frequently not what they were accustomed to and being without condiments soon palled and disagreed.

Dysentery, "the disease of armies" and diarrhoea, the result of chills and improper food were speedily universal; the hospitals were full of cases though only the most severe were allowed to go on the sick lists. One medical officer reports having to administer 500 doses of astringents daily to a force of 700 men, not in hospital. In the first Miranzai expedition about one per cent. of the whole force suffered from dysentery but there were only three admissions

from diarrhoea! In the Lushai campaign 33 per cent. of the total deaths in hospital were from dysentery and diarrhoea and 50 per cent. from cholera.

Before half the distance to be covered was completed, the British officers in the Lushai country were suffering so severely as to endanger the success of the expedition, and compel the principal medical officer to protest against the food supplied to them. This was practically a pound of salt meat, beef or pork, with a pound of biscuit, 8 oz. of potatoes (frequently bad), pickles, tea, sugar &c. They were entitled to a pound of fresh meat once a week, but in practice this took the form of tinned Australian mutton of inferior quality, which was issued in 6 lbs. tins and was supposed to last six weeks, although it became poisonous after the second day. The greater part of the salt, beef was putrid, so that "pickled pork and Captain's biscuits" were the main ingredients in the diets. Two officers died "from disease induced by unwholesome food, several others showed alarming symptoms, some were obliged to seek change to Europe and others are still suffering." (Report of M. O. of 42nd Assam Light Infantry). In the first Miranzai expedition no British officer was on the sick list, in the second there were 12 admissions out of an average strength of 172, but five of these were for wounds, and all the others were slight cases.

With the exception of the heavy dews, the climatic conditions of the Lushai campaign were favourable, and fevers and chest diseases were much less troublesome than might have been expected. Yet the former caused 12 and the latter 13 deaths. In the first Miranzai expedition 66·66 % of the deaths were due to pneumonia caused by constant exposure to wet and snow, but 66·66 % means only four deaths in all.

The chief cause of mortality with the Kachar column was however cholera, which caused according to the official return 155 deaths in hospital, after deducting the 201 deaths among the hill coolies, and most of the 88 casualties among the Kukis, say 444 deaths. If we deduct all these cases from the total of 584, and deduct moreover 10 more for men killed in action or dead of wounds we shall have 130 deaths from disease to set against the 6 of the first and the 10 of the second Miranzai expedition, in neither of which did cholera appear, and as to which it cannot be pleaded that the difference was due to special and unavoidable causes. It is hardly fair however to class cholera as a special and unavoidable cause, for although we are not yet in a position to dogmatize as to the exact etiology and pathology of cholera, we know that all conditions which lower health, lower thereby the power of the human body to resist disease, and so favour its development; while sanitation when thoroughly and systematically carried out can practically banish it. It has been banished from Fort William. It is now extremely rare in the European quarter of Calcutta, formerly "the white man's grave." It never occurs in the Fort at Kohat, where sanitary rules are observed, though it causes in that station more deaths by many times than in all the other frontier stations put together, and it is now generally recognized by sanitarians to be a preventable disease. There can be no question whatever that the general conditions both

natural and artificial during the Lushai campaign were such as to favour the spread of the disease and increase its ravages should it once get a foot hold. By natural conditions are meant that cholera is endemic in the country through which the troops had to pass to reach the scene of action, and experience has repeatedly shown that men passing through that country, especially hill men, are obnoxious to the disease, the danger increasing in proportion as men are massed together. By artificial conditions are meant details as to space, ventilation cleanliness, clothing, food, water supply, shelter, work, opportunities for medical attendance &c. Let us take the case of the Nepalese or hill coolies. They were specially selected men, for the most part of splendid physique, though some were too young. Provided with the sanctioned scale of clothing they marched from Karsiong to Dhubri, 11 marches, and remained three weeks before embarking. With the exception of one suspicious case which recovered, and seems to have been "caused by a surfeit of chura (parched rice)" they had no serious sickness. The question of their transportation had been the subject of the most serious thought, and full directions had been worked out with a view to keep them in health during the passage from Dhubri to Chattak, these instructions including rules for use in case of cholera. The rules are admirable, and could not be improved upon at the present day. Rules, however, are useless, unless they are properly enforced, and if the authorities "*les respectent comme théorie, mais ne les mettent pas en pratique*" as Cheun says of the French administration, the rules are not answerable for "*les douloureux et funestes effets.*" Eight hundred and forty coolies were to be transported, but the transports provided had room for only 780, allowing to each man only six feet by two, just room to lie in. There is nothing to show how far this space was "real, or whether as is likely" says the head of the medical department in reviewing the outbreak "its amount was curtailed by the presence or movements of the crew, or by objects, fittings, baggage &c, which might occupy a measured deck area" "in consideration of the lateness of the season, the adoption of strict sanitary precautions and the pressure of circumstances" the medical authorities had agreed that 800 men might be put on board but the 840 men were somehow stowed away in the space which without encroachment of any kind only allowed 780 to be packed like sardines, and the voyage began. A hospital assistant was in medical charge, and had an ample supply of medicines and disinfectants, but only one uneducated compounder to help him. A regiment of less strength would have had a medical officer, two hospital assistants and a complete hospital establishment. The day the voyage began the hospital assistant developed pneumonia. Within three days diarrhoea became very prevalent and was ascribed by all to the "villainously bad" ghi supplied. "Its smell was sickening, its taste bitter and when taken with food it caused nausea and retching." Orders were issued that it was not to be used, and on Captain Hidayut Ali touching at Dakka the whole of it was condemned by a committee as "rancid and quite unfit for use." One case of cholera occurred the day the steamer reached Dakka, but there was nothing to indicate the approaching calamity and the vessel was allowed to proceed, another hospital assistant having relieved the first, who was landed dangerously ill. By the

end of the next five days 57 deaths had occurred, and the cooly corps was a terror-stricken demoralized mob, the moral influence of fear and the consciousness of neglect, helping still further to develop the disease. For the new hospital assistant had become demoralized also, and sought to drown his fear and helplessness in rum. He was constantly drunk and unfit for duty. Captain Hidayut Ali kept his head and carried out the instructions for his guidance to the best of his ability, but as may be imagined the rules did not help him much under the circumstances. Men deserted in scores, some were caught and brought back, others were drowned others died of cholera in the jungle. The voyage ended on 22nd November, but the disease continued worse than ever, and when effective assistance arrived on the 26th, Dr. J. B. White found "68 men in various stages of cholera and fresh cases occurring hourly, 25 having been reported in the previous twenty-four hours." It is unnecessary to dwell on the vigour and promptitude with which he acted; it must suffice to say that only one fresh case occurred after his arrival, and that the disease was promptly stamped out by isolation of actual cases, constant inspection of the men, prompt treatment of premonitory symptoms, and a general enforcement of sanitary rules. The remainder of the corps did excellent service throughout the expedition. The outbreak was the subject of a prolonged enquiry and various theories were propounded as to its cause. The men themselves attributed it to the ghi, Dr. White to the overcrowding, the Surgeon-General to endemic influences. All probably contributed. For while it may be conceded that neither bad ghi nor overcrowding can *originate* cholera, which is believed to be due to a specific cause, germs, bacillus, bacteria, or what not—; there can be no doubt that they would operate in favour of the germ, existing in the endemic area. Wheat, sown on a rock will not germinate, sown in good ground it bears fruit an hundred fold. Cholera germs sown on a rock will not germinate either, and perfect sanitation is such a rock. They require a suitable soil and such is prepared by bad food disturbing the digestion and lessening the power of resistance to disease, filth, overcrowding and all insanitary conditions. In such a soil they too bear fruit an hundred fold and the occurrence of the outbreak under the conditions present was no more to be wondered at, than was its immediate cessation when the reverse conditions were promptly introduced by Dr. White. This is not theory but sober fact, based on universal experience in all countries.

It would be wearisome to trace the subsequent course of cholera in the force, cases occurred in small groups all along the Barak river; but with the exception of one outbreak, which caused 21 deaths among a batch of 400 coolies sent up to replace losses, it never assumed epidemic dimensions until the force left Sipai Mukh, on its return to India. It had then to descend the river and pass through the district where these cases had occurred, almost every detachment was attacked, the totals running to about 120 cases with 70 deaths. The force *had* to run the gauntlet and every effort was made to avoid disease, but there can be little doubt that had they not been reduced in strength by the hardships of the preceding three months, they would have suffered less. The

main causes of the very heavy mortality of this campaign have been already indicated but may be briefly re-capitulated.

1. *Want of personal cleanliness.*—This was specially true of the Nepalese and Kuki coolies who were “indescribably filthy” and “little removed from animals.”

2. *Insufficient clothing.*—The one blanket and blanket coat were quite insufficient to protect against the cold at night, which was considerable even between Kachar and Sipai Mukh, and very considerable at the advance posts, some of which were over 5000 feet above sea level.

3. *Want of shelter.*—The troops had waterproof sheets and with these and materials cut from the jungles, managed to protect themselves from the heavy dews. The local coolies also managed to contrive rude huts, but the bulk of the Panjabis and Hindustanis were very helpless and were constantly drenched to the skin.

4. *Excessive work.*—During the whole three months every man with the force was overworked. The only limit was physical exhaustion. The troops were constantly engaged in road and stockade making, building huts, escorting convoys &c. They “came off picket to go to work, and returning from work went on picket.” (Report of the M. O. 44th Sylhet Light Infantry.) During December and February the men were in bed only every other night and on the march each soldier carried a weight of 49 lbs. quite as much as the coolies, who moreover escaped picket duty.

5. *Improper diet.*—In quantity the diet was sufficient, and so far as the troops were concerned the quality was good. For the first six weeks however, the essential condiments were not available, and the men came to loathe the sameness of thin diets, advantage was taken of this to reduce it by 25 % and as condiments were eventually supplied, the men did better on the smaller quantity than they had on the large, because they could eat it with relish. All the reports are however agreed that an immense amount of sickness was caused at first by the want of seasoning materials. The defects in the rations of the officers have been sufficiently commented on, so have the mistakes which gave rice to wheat eaters and flour to those habituated to rice. “They mixed it with water and ate it raw: this diet caused dysentery and severe bowel affections” (Dr. Buckles report). The water supply was usually excellent, being obtained bright and sparkling from running streams. A dram of rum was given to the troops every other day, and was grateful, comforting and much looked forward to after a hard days work. Coolies were not allowed to have it, during the first six weeks, but this rule had to be relaxed, and an occasional dram was found to be the best means of preventing their deserting and putting heart into them for their heavy work.

6. *Insufficiency of Medical attendance.*—The supply of medicines was ample, but the paucity of medical officers was greatly felt. The regimental system was still in vogue, but a large base hospital was established at Kachar and another at Sipai Mukh to receive sick from the front and pass them to the rear, and as a long chain of posts, some 17 in number had to be held, it was necessary to have medical aid in some form at each. A number of these posts were supplied by

regimental medical officers and hospital assistants, but the rest had to be officered by the staff sent for general duty. This consisted of three medical officers and nine hospital assistants. At the Kachar Depôt Hospital under the care of the Civil Surgeon 1569 cases were treated. The average sick, spread over five months, being 76, but the actual number at times being three times as many. The whole of this work was in addition to his ordinary duties as Civil Surgeon, and for the greater part of the term he had no assistance whatever. At Sipai Mukh 1937 cases were treated in less than three months, the average daily sick was over 200 and the number more than once exceeded 400. A modern field hospital for 100 sick has four medical officers, one for each section, and seven hospital assistants. During the greater part of the time there was but one medical officer with one hospital assistant at Sipai Mukh. With the best will in the world it was impossible that he could do justice to his cases; and he was in addition medical store-keeper to the force, had to inspect and treat the sick at cholera camp, and had the whole administration of his hospital to look after, diets, sanitation statistics, in addition to his medical duties. There were neither clerks nor nurses nor orderlies, and the treatment of the sick was necessarily somewhat perfunctory. There can be little doubt that with a larger staff and more complete equipment many lives would have been saved.

The medical arrangements at the small stations and at the head quarters of regiments were of the most primitive description. The regimental hospital equipment being too heavy for human carriage was left behind, and a pair of field panniers substituted, but these were very different from those now in use. The modern field panniers are the most ingenious epitome of medical and surgical wants. They contain everything likely to be wanted in any conceivable contingency, so packed as to be immediately available, the place of every article being known. The Lushai panniers had neither drawers nor partitions, they were mere ration baskets covered with waterproof cloth into which stores were thrust *pêle mêle*, the individual bottles being wrapped up in tow to prevent breakage. Great delay and inconvenience were thus caused when medicines were wanted on the march, and there was neither time nor opportunity for scientific prescribing. A few stock medicines, chiefly astringents and quinine, had to do general duty and the bulk of the medical stores went back unopened at the end of the expedition that with a larger staff and more complete equipment many lives would have been saved.

7. *Over crowding.*—Beyond that on board the transports with the Nepalese coolies there was little of this, for though at times it existed technically in the different hospitals, their walls of bamboo mats were so well ventilated that no bad results ensued, and the wounded did remarkably well.

8. *Conservancy*—Was very carefully attended to at the camps, most of which were kept scrupulously clean; but there were unavoidable defects on the connecting roads.

We see then that in respect of almost all the rules of health there were serious defects. The most strenuous efforts were made to

remedy them and in many directions with considerable success. Before the end of the campaign the commissariat department had managed to arrange for a supply of fresh meat for the British Officers, established bakeries, got up condiments, fresh vegetables, salt fish for the Kuki coolies and so on.

We now pass on to consider in a little fuller detail the operations of the two Miranzai expeditions of 1891. The first was undertaken to punish a long course of outrages on the part of the Orakzai tribes, the second to punish a treacherous attack on troops left to guard the posts and make roads on the frontier. Physically the country is not unlike Lushai land except that the hills are higher and almost entirely bare of vegetation. The first expedition extended from 18th January to 25th February, the second from 14th April to 7th June the climatic conditions of the first being those of a Panjab winter, those of the second of the hot weather. Ample time for preparation was allowed for the first; we struck at our own time, hardly any time was allowed for the second, the enemy having attacked the working parties on the 4th April, and the retributory force starting ten days later. In the first, which had an average strength of 5019 troops and 2345 followers, only natives were employed: in the second with a strength of 7203 troops and 2882 followers, 624 of the former were English soldiers, most of them belonging to the 1st King's Royal Rifles, very young soldiers just arrived in the country and quite inexperienced in the art of campaigning. The maximum distance from the base did not exceed 70 miles, mule carriage was available, and although a great deal of labour had to be given to road making, the more open nature of the country made this less than in the Lushai jungles. In the original programme for the first expedition, the troops were ordered to bivouac, but on the strong representations of the general officer commanding tents were eventually allowed. Less carriage being available during the second expedition in consequence of the Hazara and Manipur Field Forces having to be supplied. Tents were left behind at first, but were ultimately got up to the stationary camps although men with detached columns had to bivouac. Both troops and followers were perfectly equipped with suitable clothing. On the first occasion, when it was known that great cold would be experienced, every fighting man had a postin (sheep-skin coat), most of them woollen jerseys in addition, while all troops and followers had two blankets and a waterproof sheet; and each follower had besides a jersey, a blanket coat, a pair of woollen socks and leg bandages. Shelter was provided as already mentioned, an inexhaustible supply of firewood was to be had for the trouble of cutting it. Each sepoy had 30 lbs., each follower 10 lbs. of baggage carried for him. On the Lushai campaign the soldiers allowance was 12 lbs. while the follower had nothing carried for him. The arrangements of the commissariat left nothing to be desired. A full and varied ration of excellent quality was supplied with unflinching regularity, and included the necessary condiments, while fresh meat, rum and tea were freely issued as extras when extra work or exposure to inclement weather rendered such issues advisable. Both troops and followers were most carefully selected, all sick or weakly men

being left behind at the depôts, so that the force started in the best possible order, and by universal consent no expedition was ever better fitted out. The medical arrangements were on a liberal scale although not quite up to the standard laid down in regulations. Each regiment had its medical officer and field medical equipment as noted in the

1 Pair Field Panniers.

1 Field Medical Companion.

1 Surgical havresac.

8 Field Stretchers.

margin and in addition eleven Field Hospital sections equal to 2½ Field Hospitals, while 8 medical officers and 14 hospital assistants, were posted on convenience places all along the line of communications, or accompanied the columns at the front.

Beyond one small skirmish there was no fighting, except against the elements. From the first, throughout the expedition, these made war on the force. The advance was delayed for a week by torrents of rain, which converted the camps into quagmires, and caused the greatest possible discomfort. Snow fell on many occasions, severe frost, sometimes as many as 20°, was of nightly occurrence, and storms of rain and wind were numerous. On one occasion the whole force was practically snowed up for two days, and a complete change in the programme of operations was rendered necessary; on another a march of about four miles took the greater part of the column from fourteen to seventeen hours; on yet another a column on the top of the Samana 5000-6000, feet above the sea, had to bivouac without tents after a tramp of twelve hours in deep snow. The climatic conditions were throughout as trying as they could be, and infinitely more so than in the Lushai country. Yet the force as a whole, troops and followers together, lost only six men, the admission rate was 573 91, and the death rate 7·83 per thousand per annum, probably about half what it would have been had the men been doing ordinary duty in cantonments.

That these unprecedented rates were due to the precautions taken, to the adaptation of conditions to environment, there can be no possible doubt. Had troops or followers been exposed to the foul weather met with, insufficiently clad, sheltered, warmed, improperly fed and overworked they would have died off just as they died in the Lushai country. The precautions taken and the results obtained stand as clearly to each other as cause and effect. If proof of this were needed it is at hand. "On the night of the 15th, 16th January a convoy of provisions was sent from Kohat to Sherkot by a private contractor acting for the commissariat. The men were his servants, had neither shelter nor warm clothing! three of them lay down and died of cold and exposure by the road side. The troops and Government followers at Ibrahimzai Sherkot and Kohat, sheltered, well clothed and fed, were practically unaffected by the same storm, except the 2nd Panjab Infantry, and this regiment was the only one unprovided with warm clothing or water-proof sheets. Between the 18th and 25th January before they crossed the frontier they had sent 20 men to hospital, more than all the rest of the troops put together. They then received a partial supply of clothing and waterproof sheets for about 60 % of their strength, and immediately improved in health, their additional admissions to the

close of the expedition being only 30. Many of these were, however, bronchitis, pneumonia and dysentery, and the regiment had a far larger proportion of severe cases than any other," (a report of P. M. O.)

Small as the sickness and mortality were they would have been still smaller had the fine dry cold weather usual at the time of year been experienced. Over 84 % of the admissions were directly due to exposure or the conditions of service, and the particular share of each regiment in exposure and hardships was faithfully reflected in its sick returns. The 3rd Sikh Infantry which had some terribly hard work on the Samana in snow and rain, and formed the rear guard when the Yan Pass was blocked by snow had an admission rate of 882 per 1000 per annum. The 5th and 22nd Panjab Infantry which were with the force only about a fortnight each and so escaped many privations, had only 460 and 548 respectively. The 29th Panjab Infantry employed on demolition duty, on 2nd February, had to cross an icy cold river repeatedly in snow and rain, many of the men losing their shoes, with the result that 20 men went to hospital frost bitten and at least 20 more slight cases occurred though the men continued at their duty. Four out of the six deaths were from pneumonia, the result of exposure. The almost complete absence of diarrhœa has already been commented on and was due to good water, good food and sufficiency of warm clothing preventing chills.

The whole history and the expedition shows how by the proper adaptation of means to ends taught alike by science, experience and common sense, these ends can be attained with all but perfect certainty at a minimum expenditure of human suffering and human life. From a financial stand point too, it is probably more economical so to fit out an army that there shall be no break down, and consequently no need for heavy expenditure not contemplated in the original estimates to remedy this and prevent the objects of the expedition from being jeopardized.

The history of the second Miranzai expedition teaches the same lesson, and while from a medical point of view the results were very similar to those of the first, there are several interesting and important variations in details, all of which help to point the same moral and enforce the same lessons, that when each link of a chain is perfect the chain will stand all tests, and that any imperfect link is a source of danger.

Scant time was given for preparation. On the 4th of April 14 men were killed and seven wounded in the working parties of the 29th Panjab Infantry. By the 14th the avenging force was ready, and by the 23rd the tribes broken and beaten and having lost 600 of the flower of their strength, were abjectly suing for mercy. Surely swifter Nemesis never overtook a people. But the necessity for haste made the preparations less complete than in the first instance. Indents for various articles of equipment could not be responded to in time, and deficient transport made it difficult to forward anything but the absolutely necessary supplies of food. The commissariat officers, however, worked with a will, and all essentials were eventually supplied. No tents

were taken at first, some regiments had few or no waterproof sheets and others were without portions of their field medical equipment. Fourteen sections of Field Hospitals, sufficient for the accommodation of 350 sick and wounded, were eventually supplied, but during the first week only six sections were available, one of which was on the line of rail 70 miles away, while two formed a base hospital at Hanza, leaving only three sections available at the front, one with each column, capable of caring for and carrying only 25 sick. During that week, all their columns were frequently engaged, 14 men were killed in action and 66 wounded, and the strain on the medical department was severe. Had the losses in action been much heavier difficulties must have arisen, but by utilizing the ambulance transport of the two sections left at Hanza, convoys of sick and wounded were sent to the base almost daily, and the sections with the force kept as empty as possible, ready to deal with fresh cases. A bearer column was sent out daily with the troops, who were of course accompanied by their own medical officers, field medical equipment and field stretcher. As soon as a man was hit he was picked up and placed on a stretcher, given such first aid as was necessary by the medical officer of his corps, and then carried to the dressing station of the bearer company, by two of his comrades trained as stretcher-bearers. There he was further attended to and sent back to the Field Hospital, where he remained till again fit for duty, if his wound was slight, or till he could be safely sent under proper escort to the sections at the base, and so in due course back to the station he had come from. To the foot of the hill he was carried in a dandi, or on a mule, if able to ride, from there to the railway. Ambulance carriages (tongas) took him in great comfort either sitting or lying as the nature of the case required. At each stage he found a section of a Field Hospital where his wounds could be dressed and his wants attended to, and the general efficiency of the service is attested by the fact that of 73 wounded men, including seven wounded on April 4th, only two died, both of them from gunshot injuries involving the lungs. It is worthy of note too, that the usual rule was reversed and that the losses at the hands of the enemy exceeded those from disease, 16 men having been killed or died of wounds, ten only having died from disease. Excluding casualties in action the sick returns show an admission rate of 595·83 and a death rate of 6·65 per mille per annum or very nearly the same as in the first expedition. The greater part of the sickness also was again directly due to conditions of service, but the items composing the totals are widely different. In the first expedition with its snow and rain, chest diseases, fevers and frost-bite, the result of exposure to unfavourable weather, caused a large proportion of admissions and two-thirds of the deaths. In the second the weather was for the most part fine with occasional heavy storms, but great diurnal variations of temperature, sometimes as much as forty-five degrees. There was of course no frost-bite, the few cases of chest disease were due to exposure to wet without shelter. But diarrhoea formerly conspicuous by its absence was now very prevalent and severe, partly owing to the bad water found on the crest of the Samana, but chiefly to the great daily

variation of temperature and the difficulty of inducing young troops to take proper precautions against chills. Bowel complaints gave 23% of the total admissions. The chief sufferers were the European troops, mostly young men fresh from England and quite raw and inexperienced. Their admission rate was 1690 per thousand per annum, while that of the seasoned native soldiers was only 534, less than a third. No European soldier died of disease, one man was killed in action, 11 were wounded, including officers. The native troops had a death rate of 5.25, and the followers of 11.66 per 100 per annum, but the total deaths among both classes were only ten. The larger death rate of the followers was no doubt mainly due to their being less carefully selected than and inferior in physique to the soldiers. In the second as in the first expedition supplies were excellent and abundant, fresh meat, rum and tea were issued when required, and the main defects were the want of sufficient protection against climatic conditions and an inferior water-supply. These defects were unavoidable in the circumstances of the case, but nature makes us allowance for the unavoidable, and the prevalence of bowel complaints was the direct consequence of the defects mentioned, and of the youth and inexperience of a section of the force. The net results again show admission and death rates far below the average of cantonments, and prove still further the possibility of keeping troops healthy under the conditions of active service.

The circumstances and conditions of no two expeditions are or can be precisely alike, and it is in many ways unfair to compare the statistics of a campaign like the first Lushai one, with those on the Samana. Still they all show the great truth that given favourable conditions, whether natural or artificial, the results will be good, and that given unfavourable conditions, whether natural or artificial, the results will be bad, and that it is only by adopting its conditions to its environments that an army can emerge triumphantly from the struggle for life. In the Lushai campaign great natural difficulties were met with and the means taken to cope with them were inadequate; the result was in many ways disastrous, and the success of the operations were more than once endangered. In the Miranzai expeditions great though perhaps not quite so great difficulties were also encountered, but the means taken to meet them were adequate and the result was a triumphant success, and a complete vindication of the scientific statement that disease can be banished from armies if proper precautions are taken for that purpose. It is gratifying to know too that past unfavourable experience has not been thrown away. The commissariat department is not likely again to supply salt beef and pork 50% of the weight of which is made up of kegs and brine, while the residue has little nutritive value. Animals might have been driven with the force and found abundant fodder, while saving the over-taxed coolies. The objections to human carriage were fully shown in the one case, the possibility of taking laden mules over an almost impossible country and thereby of carrying ample supplies, and tents was shown in the other. The evil effects of a monotonous and imperfect diet stand out plain in the Lushai, as the opposite effects of a sufficiently varied and wholesome diet do in the Miranzai countries.

The importance of proper clothing and shelter, the dangers of over work and exposure, the value of a good water supply are all illustrated, so is the wondrous improvement which has taken place in the medical department in the last twenty years. That, perfection has been attained, or that, equally good arrangements could be made for one or two *corps d'armées* as were possible for the small field forces engaged on the Samana, in Hazara and in Manipur are not proper subjects for discussion here and do not lie within the writers competence to discuss, but as evidence of the spirit of progress and of the earnest desire of the military authorities to use every effort to improve and render effective our military machine, the medical history and statistics of the two small campaigns on the Samana may be appealed to with confidence. A considerable number of minor improvements tending to simplify the working details of field hospitals have already been adopted and others are under consideration, and as at present constituted, they are as nearly perfect as care and forethought can make them.

THE BERTHIER RIFLE.

Lieut.-Colonel W. B. HEMANS, late R. A.

This rifle is the one with which the French government is now arming the troops in France.

The Hotchkiss Company have acquired the patent rights of this rifle everywhere out of France, and the inventor, M. Berthier, is now in the company's employ.

This rifle has been shewn to numerous officers of foreign armies, and their opinion was quite unanimous in favour of its being the simplest and most suitable for service conditions of any magazine rifle yet introduced.

The rifle has a bolt action, and gives its bullet a muzzle velocity of 2071 feet per second. The breech mechanism is of very simple type, and consists of very few parts, none of which are at all liable to get out of action.

The magazine is quite separate from, and not attached to the rifle at all, it is simply a metal clip, costing to make about a half-penny, and in it four cartridges are packed, thus forming a package of cartridges, of such packages the soldier carries as many as may be ordered, each one thus constituting a separate magazine.

To use the magazine it is simply dropped into the breech of the rifle, and the cartridges in it are fed up one by one, as its predecessor is extracted, by means of a spring which forces each cartridge vertically up into the chamber. When the fourth and last cartridge is pushed into the chamber, the magazine falls through automatically, and another can be dropped into its place.

To use the rifle as a single loader, a lever is fixed at the side, and when turned it arrests the feeding action of the spring above described as forcing the cartridges one by one up into the chamber, the first or upper cartridge in the magazine only is fired and extracted, the lower ones remain in their places in the magazine, and another is dropped into the place vacated by the first one extracted.

For quickness of fire, simplicity, handiness, general efficiency, and compliance of service conditions, the Berthier rifle can challenge a favourable comparison with any magazine rifle in existence.

The following are the particulars of the rifle and cartridge :—

Rifle ...	Calibre	0" 301
	Diameter to bottom of rifling	0" 313
	Depth of ditto ditto	0" 006
	Rifling	1 turn in 9" 45
	Number of Groove	4
	The breadth of the grooves is double that of the lands.	
Cartridge.	Diameter of bullet	0" 308
	Length of do.	1" 142
	Total weight of cartridge	grains 380
	Weight of bullet	" 205
	" capped case	" 142
	" powder (smokeless) charge..	" 33

The muzzle velocity of the rifle with 33 grains charge of French smokeless powder is 2071 feet per second, and the pressure in the chamber 14 tons per square inch.

The following are the particulars of the results of some "rough usage" trials :

A cartridge was charged with a small charge of sporting powder, fired, and the bullet jammed about half way up the barrel. It was then attempted to eject the jammed bullet, by firing a cartridge charged with 33 grains of ballistite smokeless powder, but without avail. The pressure must have been very great, but the breech mechanism was in no way affected, and the erosion was very trifling. A very slight enlargement of the chamber was observed, but there was not the smallest fissure, and the rifle continued to fire with no interruption after the bullet was forced out.

A rifle was left in mud for some days, the magazine stuffed with dirt and grit, but it was found sufficient to work the elevator for a couple of seconds to throw out the dirt, &c., which fell through the lower opening of the magazine, when the firing was carried on, and not the least difficulty experienced.

The packets of cartridges were placed in a belt bandolier, when a man firing with the waistbelt on him, succeeded in making a fair target at the rate of 28 shots per minute.

The cartridge bullets are made of hardened lead, surrounded with an envelope of white metal (melchior) 0"·02 in thickness. In France, we believe, it is intended that the soldier should carry 100 rounds of ammunition, which including the packet magazines will weigh about 6 lbs..

At a recent Government trial of the rifle the following were its performances :

Mean muzzle velocity 2071 f. s.

Pressure in powder chamber 14 tons per square inch.

Penetration of elm at 60 yards, 25 ins.

Penetration of mild steel plate (portion of machine gun shield)
7/32 in. at 150 yards from the muzzle.

Correct targets were made at the following ranges :

200 yards 0° elevation.

500 " 40' "

1000 " 1° 30' "

A skilled soldier or marksman can easily, making a target, expend 7 magazines or 28 rounds within the minute.

This rifle can be made to take the English service 0"·303 ammunition for magazine rifle and the ballistics would be identical in both cases.

For serviceability, and capability to withstand rough usage the Berthier rifle will compare most favourably with the English magazine rifle.

NEW MEMBERS.

Rank.	Name.	Corps.
Lieutenant ...	Armstrong, J. C. ...	Royal Inniskilling Fusiliers.
Major ...	Baugh, G. S. ...	21st Madras Pioneers.
Lieutenant ...	Bliss, T. A. ...	21st Madras Pioneers.
Lieutenant ...	Bowly, D. ...	21st Hussars.
Captain ...	Comins, H. ...	1st Bengal Infantry.
Lieut. Hon. ...	de Montmorency, R. H. L. J.,	21st Hussars.
Lieutenant ...	East, C. C. ...	Royal Warwickshire.
Lieutenant ...	Ewing, J. R. ...	21st Hussars.
Lieutenant ...	Fair, J. G. ...	21st Hussars.
Lieutenant ...	Graham, G. L. ...	21st Hussars.
Captain ...	Guinness, E. ...	R. A.
Lt.-Colonel ...	Hickman, T. E. S. ...	21st Hussars.
Lieutenant ...	Ievers, O. G. ...	1st Madras Lancers.
Lieutenant ...	Kenna, P. A. ...	21st Hussars.
Colonel ...	Lewes, C. ...	R. A.
Lieutenant ...	Lyon, J. W. H., ...	15th Madras Infantry.
Major ...	Martin, R. H. ...	21st Hussars.
Captain ...	Murray, G. ...	3rd Punjab Cavalry.
Captain ...	Owen, R. H. ...	21st Hussars.
Captain ...	Pilkington, H. L. ...	21st Hussars.
Major ...	Simpson, H. C. C. D. ...	R. A.
Major ...	Spencer, C. F. H. ...	Royal Inniskilling Fusiliers.
Lieutenant ...	Taylor, A. H. M. ...	21st Hussars.
Lieutenant ...	Tod, J. K. ...	7th Bengal Cavalry.
Lieutenant ...	Vicars, H. ...	23rd Madras Infantry.
Lieutenant ...	Walker, W. R. ...	15th Madras Infantry.
Lieutenant ...	Wallis, F. J. ...	15th Madras Infantry.

NOTICE.

Members who have not yet paid their subscription for 1892 are requested to kindly do so in order that all arrear accounts may be closed before the Annual Meeting of the Council.

The officers on whose behalf the following sums have been remitted are requested to notify the same to undersigned in order that they be duly credited

From V. N. Rama Rau Calcutta Rs. 5.

„ A. J. Crawford Esq., Haka Rs. 5.

E. F. H. McSWINEY, CAPT.

Offg. Secretary U. S. I. of India.

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NATIVE INFANTRY REORGANIZATION.

By **Lieut.-Colonel G. F. YOUNG**, Assistant Quarter Master General.

In my paper on this subject published in the United Service Institution Journal for December last I suggested double battalion regiments, the 1st battalion organized on the "Regular" and the 2nd battalion on the "Irregular" system.

As far as I have been able to learn no objections have been made to such an organization except such as are fully answered in the paper itself or in Colonel Lance's remarks (in regard to the 2nd battalions) which were published with it. There are, however, certain other matters, connected with our reserve arrangements and other points, a consideration of which leads me to make a proposal going somewhat further than the former paper, and which, while maintaining the principles therein advocated, may I think perhaps better meet the requirements on the points above referred to than the two-battalion regiment does, and be also more elastic in view to possible future requirements in a great war.

2.—This proposal is briefly, instead of two-battalion regiments, to have three battalion regiments, composed thus:—

- | | | |
|-----------------------------|---|--------------------------|
| I.—One Regular battalion | } | forming one
Regiment. |
| II.—One Irregular battalion | | |
| III.—One Depot battalion | | |

No. III. to remain always at the regimental centre and manage all matters regarding keeping the other two complete. Nos. I. and II. to move about together from one two-battalion station to another, and be *both employed in the field army*, though in different capacities.

3.—No. I. to be organized as proposed for the 1st battalion in the previous scheme, but having its full war complement of 1040 Non-Commissioned Officers and men complete at all times.

No. II. to be organized as proposed for the 2nd battalion in the previous scheme, except that it is to have the same complement of Non-Commissioned officers and men as No. I, (viz. 1040,) and, like No. I., be complete at all times.

4.—As regards the organization of No. III., (the depot battalion). First, we must look forward to the possibility in the case of a great war

of requiring to raise yet more battalions, in which case this depot battalion must be able to be easily converted into a third field battalion and its place, as the depot battalion, taken by a fourth battalion then raised. Hence this third battalion must have eight companies just like the other two battalions.

As regards officers I think its organization should be the same as the 2nd battalion of the group, viz., four British officers and 19 Native officers.

Whether it should be commanded by a Major with a Captain as second-in-command, or by a Lieutenant-Colonel with a Major as second-in-command, can be for after consideration; as also whether there should or should not, be a full Colonel for the whole Regiment.

None to remain always with the 3rd battalion but all ranks to regularly pass on therefrom into one or other of the other two battalions.

5.—Three of our existing battalions have $896 \times 3 = 2688$ non-commissioned officers and men. The 1st and 2nd battalions of the proposed Regiment will absorb $1040 \times 2 = 2080$ of these. I propose that the 3rd battalion should have 8 companies of 75 sepoy. If so then this latter battalion will number,

Havildars.....	40	} Total 696 N. C. Officers & men.
Naicks	40	
Drummers.	16	
Sepoys	600	

This would involve a slight increase of 88 sepoy for every three battalions.

6.—With the above organization there is no longer any need, as in the previous scheme, to keep the peace strength of the field battalions lower than the war strength. This will be a very great advantage. The strength therefore of both the 1st and 2nd battalions of the three-battalion Regiment will be in peace as in war 1040 non-commissioned officers and men, and all that they will require from the 3rd battalion on mobilisation will be “fits” in place of “unfits.”

It has been clearly ascertained by past experience that the “unfits” of a battalion ordered for service average just one fifth of its paper strength. Therefore the “unfits” of the 1st and 2nd battalions will amount to about 200 men each, and the “unfits” of the 3rd battalion to about 140 men.

Therefore the 3rd battalion will on mobilisation have, out of its total of 696, to give 400 “fits” in place of 400 “unfits;” and this it can easily do since it will still remain with a margin of 156 over and above its own “unfits.”

It will simultaneously receive $218 \times 3 = 654$ reservists of the three battalions, bringing up its total to $696 + 654 = 1350$ non-commissioned officers and men. From this total it will have to send each month to the field army about 100 men, 50 to each of the two battalions in the field.

7.—We have now to consider the question of the employment in the field of these two battalions, one “Regular” and the other “Irregular.” I need not here dilate again upon the perfect possibility of

employing battalions of the latter class. Irrespective of all else we have only to look back to the Mutiny to feel assured that they will be thoroughly good. All that I desire to maintain is that *in the infantry brigades* only "Regular" battalions shall be employed; outside that sphere let us have "Irregular" ones by all means; they will do right good service.

8.—Suppose that the field army requires,

(A) For infantry brigades 24 battalions.

(B) For divisional troops..... 8 battalions.

For the lines of communication some more will be wanted and these (like those for the divisional battalions) can easily be of the "Irregular" class. It is not easy to estimate how many battalions will be required for this purpose, depending as it does so much both upon whether such a line is likely to be long or short, and also on whether there are to be one, two, or even three such lines. I think, however, one may fairly assume that 16 battalions may easily be required for this purpose.

If so then we have as required a total of

Regular battalions..... 24

Irregular battalions..... 8 + 16 = 24

I propose to assume this number as being the minimum which should be estimated as probably having to be provided for the field army.

9.—Now suppose we assume that we ought to have for remaining behind in India, both for garrisoning India, and for a margin to meet further field requirements, the following, in addition to the depot battalions; viz:—

Regular battalions..... 18

Irregular battalions..... 18

Then we have as the total number to be maintained for all India.

(I.)—Regular battalions..... 24 + 18 = 42

(II.)—Irregular battalions..... 24 + 18 = 42

(III.)—Depot battalions..... 24 + 18 = 42

Or a total of 126 battalions in all. And these have been distributed thus:—

<i>With the field army.</i>		} 48	} 126 battalions.
24	Regular battalions.....		
24	Irregular battalions.....		
<i>Remaining in India.</i>			
18	Regular battalions.....	} 78	
18	Irregular battalions.....		
42	Depot battalions.....		

10.—Comparing this with our existing number of battalions, we have

In Bengal (omitting Guides infantry) 63 battalions.

In Bombay 26 ditto.

In Madras..... 32 ditto.

Total..... 121

Or five battalions short of the supposed requirements.

11.—Of the whole total of 42 three battalion Regiments it would have to be determined how many should be maintained in each Presidency. Possibly it might be somewhat thus—

Bengal 23 Regiments.....(69 Battalions).
 Bombay 9 Regiments.....(27 Battalions).
 Madras 10 Regiments.....(30 Battalions).

12.—As far as Bengal is concerned (*and always supposing that the above total of 126 battalions in all is considered sufficient for India to maintain*) very little change would be necessary. The raising of a third battalion for each of the five Goorkha Regiments would be about all; there would be no difficulty in grouping the remainder into threes, and in making the necessary slight redistribution of officers.

13.—A very little consideration will show that this proposal for three-battalion regiments will be a good deal cheaper than the former one for two-battalion regiments. The total number of officers for the two-battalion regiment was 24 British officers and 22 Native officers, and therefore involved for every two of our existing battalions an increase of 8 British officers and a decrease of 10 Native officers, as compared with the existing number of each class in two of our present battalions. The total number of officers for the three-battalion regiment is—

<i>British Officers.</i>	<i>Native Officers.</i>
2 Lieut.-Colonels.	3 Subadar Majors.
3 Majors.	16 Subadars.
9 Captains.	22 Jemadars.
14 Lieutenants.	
Total 28.	Total 41.

whereas the existing number of each in three of our present battalions is 24 British and 48 Native officers.

Thus taking 6 battalions as a number common to both proposals there would, supposing we had two-battalion regiments, be for every 6 battalions an increase required of $8 \times 3 = 24$ British officers and a decrease required of $10 \times 3 = 30$ Native officers.

On the other hand with three battalion regiments there would be for every 6 of our existing battalions only an increase of $4 \times 2 = 8$ British officers and a decrease of $7 \times 2 = 14$ Native officers.

This will obviously cause the present scheme to be very considerably cheaper than the former one, and as the cost of the scheme for the two-battalion arrangement was itself only about 6 lakhs annually it may fairly be anticipated that the present scheme would involve little or no increase at all.

14.—Besides being a cheaper one the present scheme has also the advantage of being a much more elastic one as regards scope for war expansion. Altogether it appears to have the following advantages over the former scheme :—

- (1) Better adapted to our reserve arrangements ; and calculated to make them much more popular with the men.
 - (2) The number of men required, on mobilisation, to be sent to the field battalions still further reduced.
 - (3) The arrangements of peace still more closely assimilated to those of war, the difference between the two being now reduced to nothing at all.
 - (4) No further question as to the 2nd battalions being equally intended for use in war.
 - (5) Less reduction necessary of Native officers, this being now of no importance, being reduced to only about 2 per existing battalion.
 - (6) Battalions will manoeuvre in peace drills at the same strength as they will be on the battle field.
 - (7) A much more elastic system as regards further subsequent expansion for war if required.
 - (8) Not nearly so many additional British officers required for the whole army : yet just as many available before the enemy.
 - (9) A system eminently suited to the establishment of regimental promotion of British officers, if desired.
 - (10) A system very plain and simple and calculated to avoid all possible confusion on war breaking out.
 - (11) Cheaper.
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SOME TACTICAL AND OTHER CONSIDERATIONS, LIKELY TO FOLLOW THE INTRODUCTION OF THE MAGAZINE RIFLE.

By Lieutenant-General H. R. BROWNE.

One of the points most likely to affect the disposition of troops in the field, is the greatly increased range of the new rifle. Roughly speaking this increase may be taken at about 700 to 800 yards, "effectively."

Put into other terms this increase means that exposure to loss during action will be increased at a much earlier stage of an advance; and that greater difficulty will be experienced in placing reserves, and other troops not actually engaged, so that they may be available at proper moments.

The branch of the service that will probably be most affected by the extended range of the rifle is artillery. Two very serious questions must almost necessarily arise.

1st. The disposition of batteries during action, with regard to supply of ammunition from limbers and waggons, and the avoidance of unnecessary casualties amongst the teams of horses.

2nd. The possibility of continuing the service of the guns them- under infantry fire.

Hitherto the effective fire of small arms has hardly approached the effective ranges ordinarily obtainable by field artillery, neither would it do so under the new conditions, but for the fact that natural limits improved by conformations of ground very largely curtail artillery ranges. The latest pattern field guns, 12 pounders, are perfectly capable of delivering accurate and effective fire at extreme distances, certainly 4000 yards is not beyond their capacity, at any rate for such purposes as the shelling of towns, camps, or bodies of troops &c., whose position and distances are known; and for these and similar purposes, it is not even necessary that the object should be in view of the batteries employed.

But the case is completely changed during action in the field. Even in the great plains of India anything like a clear range of 14 or 1500 yards is an extremely difficult thing to find; woods, groves of trees, undulations of ground, intercept the view, so that practically, the gun must be brought within the full effective range of the new rifles.

Now it is quite impossible that, under these conditions, the old system of placing limbers with their teams immediately in rear of guns in action can be maintained; both horses and drivers would cease to exist. Neither would the supply of ammunition be carried on, without severe casualties, to the men employed in that service.

It seems probable, that in future actions, ammunition waggons must be halted close to the guns, perhaps, one waggon to every pair of guns; the whole of the remaining limber waggons and teams of horses being sent either to a flank, or to such cover in rear as may be available. With single batteries no difficulties are likely to occur; but where long lines of artillery are concerned, the disposition may not always be easy.

Of course this refers to artillery in position, where it is likely to remain for some time in action.

Under other circumstances it must take its chance.

The question is for artillery officers to consider. They are the best judges of what is practicable.

Turning to cavalry; the principal duties of this arm are, to charge, to pursue, and to gain intelligence. Taking these in order, it is worth considering, how they are likely to be affected, by the new conditions of infantry fire.

First the charge: if this is to be effective, it must be made at the right moment, the right moment involving the question of "distance." Under hitherto existing circumstances bodies of cavalry could generally be kept, at hand, and in suitable positions, without suffering much during the period of inaction; and were often able, under cover of smoke, as well as of ground, to approach their point of attack very closely before being seen. The ground remains, but the smoke which so often favored them, will no longer exist. It will be difficult in future for cavalry to approach within charging distances, without first suffering both loss and disorganization. The positions to be taken by cavalry prior to an engagement will have to be more carefully selected, not merely with regard to present convenience, but also to future action.

In future battles, the moment cavalry deploys, or leaves its position, it must do so, in full view of all opposing infantry. There will be nothing to conceal it, and its advance must be made, in full face of the fire of that infantry, and of any supporting artillery for distances much greater than heretofore.

Possibly an increase of pace in movement, may to a certain extent relieve the situation. But this must be limited by the condition and endurance of horses and the ground over which they have to go.

The Tactics of cavalry in pursuit need little remark. Pursuit means the following up of a beaten and disorganised enemy. So long as "pursuit" is active and energetic it matters little what arms are in the hands of the "pursued." The next, and perhaps the most important of all the services rendered by cavalry, *i. e.* the gaining of intelligence, through out-posts and patrols, will require to be carried on with greater vigilance to guard against surprises. The service will be one of greater danger than heretofore. But there is nothing likely to necessitate an alteration of the grand principles on which it has hitherto been conducted.

No new question is likely to arise affecting infantry. But questions, presenting very serious difficulties, are certain to be intensified.

How infantry is to be moved under the fire of existing small arms. How it is to advance to the attack, and how it is to be preserved from losses, are subjects that have occupied unceasing attention since the first introduction of breech-loading arms. The latest issue, *i.e.*, the Henry Martinis, repeat many preconceived opinions and necessitate many modifications in both theory and practice, yet it was no greater step in advance than is now to be expected in the magazine rifles.

All the dangerous spaces to be crossed, will be "longer" from which it follows that the time of exposure, will also be longer, and the chances of casualty greater, even should there be no increase of the rate of fire, or its general accuracy. The distance, at which closed formations can be maintained, the disposition of reserves and supports, and the fighting method of advance will have to be re-considered.

Amongst other things, the great power of penetration of the bullet of the new arm, which is stated to be vastly in excess of anything now in use, may necessitate the complete abandonment of double ranks. If that should prove to be so, considerable changes in the instruction and exercise of Infantry must follow.

Tactical questions of no small importance are likely to arise from the increased range of the new rifle, commencing with the necessity for all preliminary dispositions of the troops prior to an engagement, having to be made at a considerably greater distance.

The extended effective range of the new rifle approximates half a mile.

That does not seem much in the abstract. But the bulk of the troops entering into action, are generally more or less fatigued. Some will have already marched long distances, others will have had bad weather and had roads to encounter. Both weather and ground may be unfavorable for movement in action. Therefore anything necessitating more distant formations previous to an engagement deserves very careful consideration. Tactical movements, *i.e.*, the movements of troops in presence of an enemy, depend of course, on what that enemy is himself doing, and here it seems likely that future Commanders will find their greatest difficulty in action; the old landmarks of the smoke of his guns and small arms being absent. It is true, that sound and light still remain; the latter in the shape of "flashes" from both guns and small arms, will perhaps be more distinct than hitherto. Trained observers may be able, to some extent, to relieve the uncertainty.

All dispositions on *both* sides being of necessity, except where specially favored by ground, made at greater distances, tactical reconnaissance, will require other methods, than the service of Patrols, and the despatch of staff officers.

A regular trained corps of Balloon Observists, well supplied with Balloons suited for the purpose, and the means of rapidly inflating and using these Balloons, must, in all probability, form part of the equipment, of future armies in the field.

It is an addition to the already great cost of war, and also to the "impedimenta" that have to be considered and provided for, yet every advance in science, and every improvement in the materials of war,

have been accompanied, by increase of cost and increase of "impedimenta." There is no help for it, it is a thing to be faced and reckoned with.

There is one point, very closely connected with these latest innovations, which seems in a great measure to have escaped attention, *i.e.*, that unchangeable and ever present thing, human nature.

How will human nature stand death and destruction, when it comes from unseen quarters, when the smoke which veiled it and much of the noise and excitement that accompanied it, are no longer present?

It is a very grave question, and one not easily answered.

War alone can decide it.

A subject perhaps a little foreign to this short paper, but worth consideration, in connection with it, is the remarkable difference in effect, between the projectiles of the Magazine Arm of the French troops and that which is about to be adopted for the English Arm.

It is stated on apparently good authority that up to 300 yards the bullet of the French (Lebel) rifles has a "shattering," almost explosive effect; causing wounds of the most formidable character; destroying completely both bone and tissue, and that beyond 300 yards this destructive character gradually lessens till at the longer ranges the injuries inflicted are comparatively slight and easy to heal.

If the facts are so, and from the extremely high initial velocity of the bullet of the French Lebel Rifles, (which is lighter than that of the English arm) it is highly probable that they are, the French arm would appear to possess, the "stopping power" at short range, that is wanting in our own.

So far as yet tested, the English magazine rifle, merely inflicts clean, small, easily cured wounds, irrespective of range, and if it is considered that the bullet, or rather lead, of which it is made, is enclosed in a strong sheath of hard metal there is little reason to expect that it will do otherwise. The difference is of an important character.

If newspaper reports are to be accepted, a considerable portion of the troops engaged in the recent civil war in Chili, and particularly those engaged in the action fought near Valparaiso, were armed with repeating rifles, a magazine arm of the latest pattern, it would be interesting and instructive to ascertain from medical officers who were present, the general character of the wounds they treated.

THE TERRAIN IN ITS RELATIONS TO MILITARY OPERATIONS,

Being a Prize Essay by Lieutenant H. A. REED, 2nd U. S. Artillery,
published in the January Journal of the United States
Military Service Institution.

By terrain is understood the ground, its configuration and natural and artificial diversification ; the topographical character of the country, region, or tract, as viewed from a military standpoint.

The subject is unusually interesting because, as an element for consideration in most military operations, the terrain possesses a value at least equal to that of either time or distance.

Every theatre of war, field of operations, battle-field, skirmish-line locality and outpost, presents its peculiar topographical features, which may become aids to success in direct proportion to the amount and degree of skill displayed in making use of them. In grand operations ; mountain ranges, valleys, deserts, lakes, rivers and forests : in minor operations ; hills, ravines, ponds, brooks, marshes, woods, thickets and undulations of the ground, either in their natural condition, or as modified by art ; and the more minute feature usually encountered on the skirmish line and in outpost duty, are most powerful though silent participants in the various phases of the struggle ; and their probable, though often certain influence and effect require most careful study for proper utilization.

For a subject of such importance and wide application, it is impossible, within assigned limits, to attempt to cover the ground with more than a description of salient features ; for which purpose and the method and convenience afforded, the following subdivision is adopted :

I. Examples of the Influence and Effect of Terrain on Military Operations.

II. Analysis of Terrain in its Relations to Military Operations.

III. Considerations as to the Necessity for a Knowledge of these Relations.

IV. Remarks upon the Means of Obtaining Information as to the Terrain.

EXAMPLES OF THE INFLUENCE AND EFFECT OF TERRAIN ON MILITARY OPERATIONS.

(a) Theatres of War and Fields of operations.

History shows that in a theatre of war possessing a great extent of terrain, it is more difficult to foresee or even calculate the probable outcome of military operations. The occupation and observation of different parts of the theatre frequently require long lines of communications, which, with secondary bases at remote intervals, expose any of the armies so conditioned to unforeseen assaults that may render nugatory.

the most carefully prepared plan; and the great intervals which at times separate the armies of either side render it an almost superhuman task to preserve that control and direction necessary to the attainment of the common end. But in a narrow theatre, proximity of the contending armies is forced, control is comparatively easy, the struggles are usually fiercer and more frequent, and, as a rule, the conflict is soon ended. The former case is well illustrated in the campaigns of Napoleon and of our Civil War, and the latter by the wars of 1866 and 1870.

A map calculation shows that the actual theatre of the Franco-German war of 1870 included about 50,000 square miles; and that of our War of the Rebellion, nearly 780,000 square miles, or about fifteen times the former area; in fact, the Virginia field of operations alone, to which is added that portion of Maryland and Pennsylvania traversed by the local Union and Confederate armies, closely approximated in extent the Franco-German theatre. At the respective dates, the population of each of these theatres was about 10,000,000; and the numbers engaged in important battles, in several instances, were about the same in the two wars.

The contrast afforded by this comparison of extent of terrain is fairly equalled in degree by that of the main topographical features. In some of our fields of operations and in large parts of others, towns, villages, and often even settlements, were few and far between; and, as a natural consequence, highways or good roads were scarce, and, therefore, in many cases, unavailable for the marches incident to the solution of a suddenly prepared strategical problem, or to a tactical combination. Several of these fields were also traversed by mountain chains and broad rivers, which next to deserts, are recognized as the most formidable of military obstacles; and open country was the exception.

In the French territory, on the contrary, owing to its dense population, the entire region was under cultivation; towns and villages were separated by but a few miles; excellent connecting roads traversed the country in nearly every direction and at short intervals; and the general configuration of the ground seldom exceeded in harshness the undulating type.

The difference in effect of these conditions on the respective military operations was consequently very pronounced. In the Franco-German theatre the marches were performed with celerity and great uniformity; hence, combinations could be rapidly and accurately effected. As the troops obtained food and shelter, as well as transportation in an emergency, at the bivouacs, from the inhabitants, the march was neither impeded nor encumbered by the enormous camp-equipage and subsistence trains, which the nature of our own country rendered necessary; and the absence of broad rivers dispensed, to a great extent with the use of the cumbersome pontoon equipment, which at times so critically delayed the movements of our armies.

The theatre of the war of 1866,—the belt of territory extending from Hanover to northern Italy, and including these limits,—approximated in extent 100,000 square miles, a little over one eighth of our own theatre. Its natural topographical diversification is similar to our

own; but, like the Franco-German theatre, its population, about 33,000,000 was far more dense and its highways and other artificial features were consequently, for like areas, very much more numerous.

Considering the wars of the present century, the foreign theatre which presented an extent of terrain equal to that of our Civil War was the scene of Napoleon's campaigns, during the period in which it included France, the greater part of Spain, the present German empire, Italy, Austria and the invaded portion of Russia. The topography was at least as varied as ours, but with the striking difference, in its relation to strategical movements and the supply of armies, of the absence of steamboat, railroad and telegraphic communication.

In studying the recent wars of Europe and of the Rebellion, there is another marked difference, the proper consideration of which is most apposite to the present subject, and valuable in comparing respective army movements and dispositions: and this is that, in the European wars, operations were conducted over ground of which minutely accurate topographical maps were usually available; whereas, in our war, topographical knowledge of the country was so deficient that in some cases,—notably, on the Union side, in the advance up the peninsula toward York-town, where even a river was wrongly mapped—entire armies were deflected from their intended direction.

Nor was this lack of knowledge of the terrain confined to the Union armies. The Confederates, strange as it may appear, were likewise, at times, very ignorant of the topographical features, even in cases where a knowledge of them was of vital importance, and plenty of time had been given and opportunity afforded after the outbreak of the war for its acquisition; for instance, referring to the battles preceding the withdrawal of the Union army from the Chickahominy to the James, a Confederate general, D. H. Hill, states that "The maps furnished to the commanders of the Confederate army were very full in regard to everything within our lines; but a red line on the east side of the Chickahominy and nearly parallel to it, without any points marked on it, was the only guide to the route on which the march was to be made." Another Confederate general, E. M. Law, adds: "Throughout this campaign, owing to ignorance of the country and lack of reconnaissance of the successive battle fields, the Confederates attacked just when and where the enemy desired. The real trouble was that the Confederate officers, even those in high command, knew little or nothing of the topography of the country in which they were operating. An accurate map in the hands of each division commander would have ensured time enough to bring the whole Confederate force upon the field of Gaines' Mill several hours before it reached there. If the Union right had been broken at 4 o'clock instead of 6-30 P. M. night would not have intervened to cover the withdrawal of the routed troops, and the right wing of the Union army could have been captured or destroyed in attempting the passage of the Chickahominy. McClellan was a long time in getting from Yorktown to this position, and all his movements indicated the probable position he would take in front of Richmond. There was no lack of time therefore to map the locality accurately, and no lack of

warning that it would be of the most vital importance. To undertake the defense of a city, without attempting to learn the topography of the country around it, was a new principle in modern warfare." It is unnecessary to state that the lack of sufficient knowledge of the country, on the part of the Union army during the advance in this campaign, at times seriously interfered with its proper conduct. In fact, it was a general failing in most of the campaigns of the war.

The effect of pronounced types of configuration on grand operations is probably nowhere better illustrated than in Napoleon's campaigns in Spain and Italy, and in those of our Civil War which took place in Virginia, East Tennessee and Georgia. The former are prominent in history and familiar to every military student while the latter will receive greater attention in this respect as time progresses.

Among the many illustrations from the latter source that could be cited, there is one of which mention is seldom made, and which is alike remarkable as a strategical success and for the important results gained with so little loss. June 23, 1863, the Union army under Rosecrans left Murfreesboro, Tenn., with a fighting force of about 50,000, Bragg in command of the Confederates, numbering about 45,000, occupied Shelbyville and Tullahoma, respectively 14 and 18 miles southeast of Murfreesboro; and these points had been very strongly fortified during the preceding six months in order to oppose any attempt on Chattanooga, a most important railroad centre and the main objective of previous campaigns of the Union forces in this field of operations. The country between Murfreesboro and Chattanooga presented a variety of natural diversifications of the most pronounced types. West of Shelbyville, although wooded, it was fairly level and with good roads; while to the east, the upland region, thickly wooded and with its narrow and winding country roads, offered continuous obstacles to the advance: moreover, access to this part was to be had only through a few gaps in the intervening foot-hills. The cavalry under Stanley was sent "20 miles west and a little south of Murfreesboro with orders to advance on Shelbyville, June 24th, in bold array; and, at night, to fill the country to their rear with camp fires extending from the left to the Confederate General Hardee's position at Shelbyville westward, indicating the presence of a heavy infantry force." This ruse retained Hardee. Wilder's "splendid brigade of mounted infantry," armed with Spencer repeating rifles, moved directly on Tullahoma, passing through Hoovers' Gap at a trot, and drove the enemy's strong pickets and their reserves back upon the infantry division which held a fork of the Elk River, about four miles from Tullahoma. Although this division was reinforced by a brigade, Wilder held his ground until a division of the 14th Corps, which had followed the movement as rapidly as possible, came to his assistance and secured the bridge across the fork; whereupon the Confederates fell back to their main line. The 20th Corps followed the 14th; the 21st was directed towards Bragg's right and rear; while the reserve corps held the ground in front of Murfreesboro. The first two corps mentioned, after a sharp contest for Liberty Gap, then bivouacked within two miles of Tullahoma. Guy's Gap in front of Shelbyville was

captured by Stanley, and the occupants were driven back through the town, which was evacuated by Hardee who had then been withdrawn toward Tullahoma. On account of the frightful condition of the roads, the 21st Corps marched but 17 miles in four days, and, when it arrived, line was formed as if to attack Tullahoma, in order to mask a flank movement through the woods to Elk River bridge, four miles in rear of Bragg's position. The force employed for this purpose arrived just in time to witness the crossing of the Tennessee by the rear of the Confederate army.

Tullahoma and Shelbyville were thus gained with very little loss by Rosecrans' brilliant manoeuvre. The writer can vividly recall the abatis nearly half a mile in breadth, consisting of felled trees with their outward projecting branches carefully pointed, which covered the glacis at Tullahoma, and the feeling of intense satisfaction expressed that our army had not been called upon to charge these works over such an obstacle and in the face of the murderous fire that would have been brought against us: and Shelbyville was as strongly protected. As the Confederate commander naturally believed that the Union advance would be over the less difficult country to the west, it is fair to assume that this success was entirely due to the nature of the terrain, which made it possible thus to deceive Bragg with the idea that Shelbyville was the objective; and to mass the main Union force against Tullahoma, with almost no opposition, and thence threaten the Confederate line of communications to the extent of causing Bragg's retreat; neither of which results could have been so easily attained if the country had been open; and it may be presumed that had it not been for the severe rains which delayed the 21st Corps at least two days, thus preventing a battle that would probably have taken place at some point between the fortifications and the Tennessee, Bragg's army would have run the risk of total defeat. It is possible that the strong impression then produced of the importance of the results actually attained, may be somewhat due to the fact that this operation was the first well-defined and successful exhibition of strategy, in which an entire army participated, of which we had had any experience or knowledge in the western field of operations.

In the continuation of this campaign, during September, 1863, from the Tennessee to the battle-field of Chickmauga, a distance in a direct line of but 25 miles, three ranges of mountains thickly wooded were crossed. The city of Chattanooga, located at the northern extremity of the middle range, was soon evacuated by the Confederates. In this advance, the Union forces were widely separated: two corps crossing the middle range, one about 46 and the other 25 miles below Chattanooga, while another remained in observation near the city and in the vicinity of the Confederate army, which outnumbered it three to one. That such a movement or disposition of its forces was possible without destruction of the Union army in detail, was due entirely to the nature of the terrain: the screen afforded by the mountains and woods prevented the Confederate commander from perceiving his opportunities.

From September 21st until November 24th of this year, the Union army was besieged in Chattanooga; and here again the terrain exercised a powerful influence. The main line of investment occupied Lookout Mountain to the south and the hills of Missionary Ridge on the east, while the Tennessee enclosed the Union army on the other two sides. The only railroad that had been available as a means of supply passed along the base of Lookout, hence the line of communications was diverted to a circuitous and very difficult route through the mountainous country, north of the Tennessee, to the rear of the city. So difficult, indeed, was this route, that even with the expenditure of 10,000 mules in transporting supplies over it, the Union army was reduced to extremities in both food and clothing before reinforcements arrived from the east and west, and the battle of Chattanooga raised the siege.

As an incident of this part of the campaign, and as illustrating the moral effect that certain conditions of terrain in military operations may have;—when, by reason of their defeat at Chickamauga, the Union forces had retired to the intrenchments at Chattanooga, the presence of the deep and broad Tennessee immediately in rear, added much to the universal feeling and resolve, that no effort of the enemy should succeed in driving them from the position.

The struggle for the possession of East Tennessee, by reason of its peculiar topography no less than its geographical position, was, throughout, a most important factor in the operations of our war. Its mountain barriers and central situation made this region the "Keep of the Confederacy"; its fertile valleys furnished, early in the war, a considerable portion of subsistence for the Confederate armies, and were traversed by the most direct railroad route between their eastern and western fields of operations; hence, the desirability of its possession by either side made it the scene of hard-fought battles and persistent sieges, of which the difficulties attendant upon tactical combinations and supply were almost entirely due to the rugged nature of the terrain.

That part of East Tennessee east of Knoxville, together with Eastern Kentucky and West Virginia, constituted a field of operations known as the "Mountain Department." It consisted "practically of about 500 miles of mountain ranges," and was in reality a wooded wilderness crossed by very few and most difficult roads. The country was so wild that but little forage could be found in it; and, in the marches across it, the teams could hardly haul their own provender for the round trip. But the effect of terrain of this description and location on the general operations of the Union armies was beneficial in the highest degree. It constituted an almost self-defensive curtain between our salient eastern and western fields of operations. Although this was not entirely devoid of severe engagements, which took place more especially along its borders and in the early part of the war, comparatively small bodies of troops judiciously disposed proved sufficient, during the entire period, to protect the rich valley of the Ohio beyond it from invasion.

(b) Battle-fields and Positions.

As in strategy, the arm with which a force is equipped has but little bearing on the mode of application of its general principles, so in tactics,

the general dispositions and combinations of forces on and in the immediate vicinity of the field of battle, are now only modified by the introduction of the most modern weapons, to the extent of prescribed greater intervals and distances. The most important elements of direction of attack and vantage positions are governed by the same conditions as in the time of muzzle-loaders; hence, it is not deemed necessary, in seeking for instructive examples for the further elucidation of this subject, to be confined to the most recent foreign wars in which alone breech-loaders were universally employed. Cover from the enemy's fire and vantage ground have been desiderata since the time when hand-to-hand weapons were replaced by projectiles; and recent improvements in fire-arms, by which distance has been overcome to a still greater degree and rapidity of fire increased, have only broadened the field of action, enforced the dispersed order to a greater extent earlier in the battle and probably hastened the termination of the struggle. Nearly all battle-fields where fire-arms have been employed afford valuable information on the subject in hand.

The terrain in and about Vicksburg, the scene of Grant's operations from November, 1862, to July, 1863, consisted of a series of irregular hills, bluffs and narrow tortuous ridges, in many cases thickly wooded, with numerous streams varying in magnitude from that of the broad Mississippi to the narrowest water-course which could offer an obstacle to the passage of troops; hence, "it was easy for an inferior force to delay, if not defeat, a far superior one";—witness the result of the battle of Chickasaw Bluffs, in which 33,000 Union troops were repulsed by 25,000 Confederates, with losses of 1776 and 207 respectively (Official Records); also the difficulties attending the final advance from Bruinsburg, when every hill and stream was occupied to delay the progress of the Union army, and reconnaissances were constantly required between the different corps in order to maintain supporting distances over practicable roads. Vicksburg itself, by its peculiar topography, was a natural fortification, requiring hardly more than the emplacements which were made for men and guns to make it fairly impregnable to assault. Attacked from the north, south, or west across strong defensible positions and almost insuperable obstacles, with its eastern communications open for supply and reinforcement, it could have held out indefinitely; and the military skill and judgement of General Grant is in no instance better shown than in his tactical combination and disposition, in which the topographical features were made to subserve his purposes; and by which this line of communications was closed, Pemberton's army isolated, and the stronghold reduced by regular siege operations.

At Fredericksburg, December 13, 1862, the configuration of ground was the all important aid to success of the Confederates. Marye's Hill was a central salient of the Confederate position, which occupied a range of hills or bluffs extending from a sharp bend of the Rappahannock, the left of the position, in a south-easterly direction and generally parallel to this river, for a distance of a little more than seven miles. Between the bluffs and the river, an average distance of 2000 yards,

was a natural glacis, intersected near the left by a canal, centrally by two runs, or narrow water-courses, with a few scattered gullies, and opposite Marye's Hill by the town of Fredericksburg on the river bank. Marye's Hill was regarded as the key to the position; and possessing at its foot a road, enclosed on its outer edge by a shoulder-high embanked stone wall, behind which were about 2500 infantry, reinforced when depleted, and with its front swept by direct and cross artillery fire, it proved impregnable to repeated assaults; and it can be safely said that its strength was such that a force, double that which attempted it by frontal attack, could not have gained it in this manner. The influence and effect of such a powerful aid to the defense on the operations of the Union army were so positive, as to render nugatory all attempts made during the battle to defeat the Confederate army.

The special feature of the terrain at Chancellorsville, May 1st to 4th, 1863, that had the greatest effect in this battle, was the woods; which, while serving as a screen for the Confederate flank march and attack, interfered with the tactical movements of the right and main portion of the Union army to such an extent as to prevent a proper disposition of the lines and effective handling of supports. When the favorable time and opportunity for getting out of the woods, by a movement to the more open ground beyond and toward Fredericksburg, had passed, the outlets of avenues through the woods and leading in this direction were so strongly held and fortified by the enemy, that an advance then by columns, the only practicable formation under the circumstances, was deemed impossible.

Gettysburg, July 1st to 3rd, 1863, was fought over a tract of country consisting of an irregularly disposed series of ridges of varying height having both abrupt and gentle slopes, quite broad intermediate valleys, and with scattered hills of more or less degrees of prominence. These conditions together with the village, numerous roads, alternately cultivated and wooded land, and the farm buildings and enclosures, made of the tract a typical battle-field in which each arm could act, at least during the earlier stages of the battle, with an effect corresponding to its special scope and power. The topographical formation was particularly well adapted to artillery, for which commanding positions with natural glacis were available on both sides throughout the battle. Round Top, thickly wooded and with rugged surface, the natural support of the Union left, and commanding a fine view of the enemy's movements; and Little Round Top, the key to the position, with their projecting spurs, were strong flank defenses to Cemetery Ridge; and, as such, by their enfilading fire proved their value in a marked degree on the last day of the battle. Cemetery Hill and Culps Hill served a similar purpose on the right. Cemetery Ridge, the curtain about 3000 yards in length, extending from near Little Round Top to Cemetery Hill, commanded gentle slopes to the front; and, altogether, the Union position was a strong one. Seminary Ridge and the ground in its vicinity offered likewise a strong position to the Confederates.

Terrain of this description has always, as in this instance, led to hard fought battles and great losses to the contestants. Presuming the

exercise of due vigilance on either side and no great disparity in numbers, the side which attacks finds the other strongly posted; and, provided no serious tactical error is committed, perseverance alone gains the victory. Two serious tactical errors on the part of the Confederates contributed greatly to their defeat, *viz*, delaying the attack on the Union left from the morning until 4 P.M., July 2nd, which gave time for the arrival of the 5th Corps, thus indirectly forcing a battle on, disadvantageous to them as the attacking party; and the other was the reckless although heroic charge of July 3rd up the glacis of Cemetery Ridge, of which the disastrous result was predicted by some of their own general officers. In these instances, at least, the importance of the elements of terrain in tactical dispositions and movements seems to have been ignored.

In the battle of Stone's River, December 30th to January 1st, 1863, the Confederate commander had many advantages in the execution of his plan, which was the counterpart of the Union commander's, not the least of which was his intimate knowledge of the ground.

At Perryville, October 8th and 9th, 1862, the occupation of Chaplain Heights by the 3rd Corps of the Union army had a very important bearing on the result, enabling this corps, after holding the position against a fierce assault, to prevent a continuance of the demoralization of the 1st Corps on the immediate left.

Space assigned to this subdivision of the subject will permit of but one more example from this source. It deals with only a small force on outpost duty, but is a neat illustration of the advantage which knowledge of the ground may confer in the face of overwhelming odds. It is described in Sheridan's Memoirs as the battle of the Booneville (July 1st 1862), and was a cavalry contest, 827 on the Union side against over 5000 Confederates. Previous to the battle, General (then Colonel) Sheridan had made himself very familiar with the country, by traversing it in various directions and preparing rough sketches of the topographical features. The Union pickets were posted immediately west of a wood which extended eastward nearly to Booneville, distant three and one-half miles, and were first attacked by the head of the Confederate column. Slowly retiring to the edges of this wood, the pickets made a firm stand across the junction of two roads, one south of the wood and the other traversing its northern portion, and both leading to Booneville, and were there reinforced by four troops which dismounted and formed line. A direct attack failed to dislodge them; but soon flanked, the line retired along the southern road to a stronger position where they were again reinforced by the entire command, excepting four troops reserved for a special purpose. Soon the Union left was so far outflanked that the capture of Booneville and of the entire command was imminent. Sheridan then assuming the offensive, despatched the four reserved troops along the circuitous wood-road, the northern one of the two above referred to with orders to turn back along the other road and charge in column the rear of the enemy's line. These orders were strictly carried out, and, in conjunction with a simultaneous attack by the main force, resulted in the complete rout of the enemy.

Turning now to the Franco-German War for a few more examples, a very instructive one is afforded by the battle of Spicheren, August 6, 1870. As this was one of the initial battles of the invasion, its loss to the French was very destructive to their morale; and, although severely contested, defeat was due less to slowness and inferior equipment of the French, than to their lack of acquaintance with or neglect of, the relations of terrain to military operations, while the Germans possessed a practical knowledge of these relations to a very high degree.

The French position included the town of Spicheren, situated on a plateau about three miles (English units are used throughout) south of the Sarre River, which here trends eastward, and the village of Stiring, which is about two miles west of Spicheren and on much lower and comparatively level ground. Thickly wooded and abrupt declivities practicable for infantry only intervened between the town and village. The base line, or lowest contour, of the plateau above referred to, beginning at Forbach one mile southwest of and skirting on the rear side, extends north-easterly to a prominent spur about one mile north of Spicheren and then trends to the east. Thick woods, unoccupied by the French, flanked their position on either side.

Thus the combat front was divided into two parts; the plateau, including the narrow spur in front of Spicheren, and the plain in front of Stiring; while the Germans, debouching from Saarebruck, opposite Spicheren and on the river bank, deployed on open ground and could employ a converging artillery fire on the French positions. Briefly, 16,000 French on a front of about two miles, were attacked by 15,000 extended on a front of about three and one-half miles; and, up to 3 P. M. after a severe struggle for possession of the spur and of Stiring, held their ground. The German infantry took advantage of the cover afforded by the woods on either flank while the French fought in the open. The Germans were then heavily reinforced and their opponents' artillery being overpowered, the spur was gained; as were also soon after, notwithstanding a reinforcement of the French, the woods on its right, as well as parts of the line between Spicheren and Stiring. Nearly all of Stiring was soon also in possession of the Germans; and the defeat of the French and their withdrawal to Saareguemines were ensured at nightfall by the Prussian turning movement towards Forbach.

In the relations of terrain to these tactical operations, it is observed that a wide interval weakly defended where defense could have been powerfully aided by natural obstacles, existed between the two parts of French position; that the woods flanking the position were also not only not properly occupied as against infantry, but that they limited the effective artillery fire to narrow sectors, preventing enfilade of the attacking lines and facilitating convergence upon themselves; and that especially at Spicheren the French had not only insufficient room for deployment, but from their own dispositions were compelled to fight in the open while their opponents availed themselves of shelter on every side. Doubtlessly as claimed the offensive was contemplated by the French, and it was not intended to fight a purely defensive battle in this position, but certainly for disadvantageous elements to the defenders, it would be hard to find a parallel case even in our Civil War.

The battle of Woerth, (known also as Fröschwiller and Reichshoffen) August 6, 1870, resembled in some respects Antietam. The general topography of the field was similar, the Sauer, although much narrower than Antietam Creek corresponded to it in position: the undulations, woods and cultivated ground on either side were disposed in much the same way, and the turning movement of the XIth Corps, and fierce contests in the left centre of the French position had their counterparts in the Confederate lines. While the disparity of numbers on the French side, which was somewhat greater than that of the Confederates at Antietam, would, on ground of this description, and as against equally brave and persistent antagonists, most likely cause their defeat, there are several points to be noticed which are pertinent to the present subject. The French position was so near the Sauer as to be commanded by the guns of superior range on the opposite bank: the bridges over this stream were neither destroyed, nor was the shelter afforded by the banks exposed to the defenders effective fire; and the ridges extending from in rear of the village of Woerth to the right, and which dominated the avenues to the French position, were not defensively prepared—the flanks were unprotected—as at Spicheren, a wood on the left afforded screen and cover for a turning movement, and an elevation on the right which could have been judiciously made use of for field works, and at least have delayed the turning movement in this direction, was left unoccupied. Throughout the battle, the Germans, in availing themselves of shelter at numerous points in the front line, showed great practical experience in turning to account the accidents of ground.

At Rezonville, August 16, 1870, the German infantry, although numerically inferior, held their own by making use of shelter, by advancing from cover to cover on the front and flank. By occupying the woods on their right and centre, they strengthened their line, while the French infantry "held only patches in the northern part of the woods of Trouville," which conditions were tactically very disadvantageous to the French as was made evident during the progress of the fight.

An examination of the official map, shows that the French position at Gravelotte (August 18th, 1870), from Roncourt on the right to the left at the bluff in front of St. Ruffine, at a distance nearly due south 8 miles and 1000 yards from the Moselle, was comparatively level, commanding ground. To the right of the centre, the configuration partook of the generally undulating character of the surrounding country and the ground sloped gently to the front, but from the centre to the left, a parallel ravine intersected the front and this slope became gradually more abrupt until near to and along the Moselle it was steep and difficult. Another parallel ravine immediately in rear and extending from the Moselle within 3000 yards of Roncourt, was traversed by a broad highway, which afforded excellent cover for the reserves and transfers of troops. Ste. Marie, an occupied village about 2000 yards in front of the right, and the smaller outposts of the centre and left, were also on well disposed ground and protected by cross artillery fire. Woods and vines covered the slopes on the left; a wood about one mile broad, its outer edge occupied, was situated im-

mediately in front of the left centre, and another of less extent and density, about one mile in front of the right centre. Numerous roads traversed the position and the ground in front and rear; and copses, hedges, fences and ditches were quite numerous over the entire country.

The main defects of the position were the absence of a natural support for the right, which, it is considered, might have been obtained by resting the right upon the forest and quarries in rear of it; and the cover afforded by the woods, copses and depressions in front, which, once gained by the enemy, served as points from which to renew the attack. Although the ground to the west was lower than the French position, the numerous woods and villages and the slight elevations afforded cover for the German reserves and for preliminary dispositions, and, in general, good positions for artillery; but it was found impracticable to conceal their principal movement which resulted in turning the French right. Throughout the battle, the topographical features enumerated and the shelter obtained from even slight undulations of the ground, were made use of as circumstances required by both the assailants and defenders, and particularly by the Germans who had become so proficient in their proper employment. They frequently served in the advance as protection against the severest musketry fire, in retaining advanced positions against infantry attack, and even the cross-fire of artillery. The stubborn defense of Ste Marie by 1500 men caused the "deployment of two strong divisions and over 100 guns and thus delayed the attack on St Privat for nearly two hours"; and when retreat became imperative, a slight ravine extending northward enabled the defenders to gain the main line without great loss. The gentle slopes to the front of Rancourt and St. Privat were particularly favorable to the defenders musketry fire; and, when the right was turned, the woods and quarries in rear served as rallying points where the Saxon cavalry was forced to discontinue pursuit.

Pont Noyelles, December 28th, 1870, shows on the part of the Germans the strength given to attack by the constant employment of shelter for infantry during preparation for the attack and the advantages derived from the use of declivities, valleys, and slight surface undulations to screen infantry movements, and the defense of Belfort, in an advanced position on the Lisaine, January, 1871, how the configuration of surface and the woods, streams and roads were carefully studied and skilfully utilized. Also in the French retreat to the Loire, December, 1870, the occupation of the villages to the north of the forest of Marchenoir caused this feature of the terrain to serve as a mask to their movements.

The Swiepowald, or Maslowed wood, at Königgratz, was, July 3, 1866, the scene of a most stubborn contest because its retention by the Prussians formed the connecting link between the two armies; and the villages along the Bistritz were effectively employed as defenses against the Austrians, while the stream itself served as a protection to the Prussian right.

Frederick the Great, in his encounters with the French and Austrians, showed his keen appreciation of the value of terrain as an element

in tactical problems, and his skill in utilizing it is well shown in the familiar battles of Rossbach and Leuthen.

(c) *Marches.*

The controlling idea on which the orders for a march against the enemy are based is "to reach him as soon as possible with all available forces, and so as to deliver the blow at some advantageous point." The next in logical sequence and for present consideration is the manner in which the nature of the terrain enters into the proposition.

The rate of march over different kinds of ground is an important element to be considered. A careful study of the marches made during recent wars gives these results: on fair roads, small bodies of infantry move at the rate per hour of two and three-fourths to three miles per hour; field artillery, three and one-half to four miles, and cavalry and horse artillery five miles. Large bodies are regulated in their rate of marching by that of the infantry, which under these circumstances, varies from two to two and one-half miles, but on sandy or muddy roads this may be reduced to one mile. Wagons heavily loaded, on fair roads, move at the rate of two miles per hour. The mean distance for a day's march of a corps, on fair roads, is generally conceded to be 14 miles. The mean daily distance for an army composed of several corps was under Napoleon, with his disciplined veterans, about 14.5 miles; and in 1870, of the German army, 13.75 miles: but in these two cases it is to be remembered that previous training and strict discipline were important factors, and that, with some exceptions in Napoleon's campaigns, good roads were available. In computing the time necessary for traversing considerable distances, requiring several days, an allowance of one-third is usually made for rest, thus making the average rate of march of an army over fair roads about ten miles per day.

In both marches and battles varieties of soil and climate are to be considered in connection with configuration of ground. In the temperate zone, as well illustrated during our Civil War, it seems to have been the rule, with but few exceptions, that marches against the enemy, as well as battles, should be accompanied by rain; and when to unfavorable configuration were added the obstacles of impassable roads, soft-surfaced fields and swollen streams, incident to severe and protracted rains, time as dependent upon distance became a very uncertain element in the computations. Numerous instances, however, show that no matter how difficult or seemingly impracticable a country thus becomes, such obstacles but develop the energy and devotion needed to overcome them.

Of the different arms, the artillery is naturally most effected by difficult roads, and two instances are given as evidence of its overcoming "insurmountable objects." In April, 1862, during the expedition against Cumberland Gap, the guns, including 30 pounder Parrotts, were dragged by the Union troops over the Pine and Cumberland mountains, "at times by means of block and tackle, at others by putting in as many horses as could be made to draw, and again by men, 200 at a single piece, hauling with drag ropes." (G. W. Morgan). Au

instance during the Atlanta Campaign at Rocky Face Ridge, May, 1864; in order to take the artillery up the steep declivity, where we had to grab the underbrush to maintain our footing, it was dismounted and the heavier parts hauled up by drag ropes and tackle attached to the trees and rocks. In several instances during our Civil War, the ordinary travelled roads were so bad and the wheels sunk so deep that the axles swept broad paths through the mud for miles at stretch.

As theory presents such obstacles as "impracticable," and thereby to some extent inculcates wrong ideas for the inexperienced, it should be upset by the great master's motto, "In war nothing is impossible."

That the nature of the terrain has an important bearing upon marches made in the vicinity of the enemy, aside from imposed rate and transportation difficulties, is amply illustrated in military history. Not only did the Blue Ridge Mountains serve the Confederates admirably as a screen in both their advance to Gettysburg and retreat therefrom, but immediately after the battle, in their march to the Potomac, the close country, rendered still more difficult by heavy rains on several days of this movement, may be said to have saved their army from much greater loss. It was the general opinion at the time that the character of the country gave the Confederates such excellent facilities for defense as to make an immediate pursuit and attack unadvisable. Similarly the Austrians, after their defeat at Königgrätz, availed themselves of the Carpathian Mountains as a screen or defense in their retreat toward Vienna.

Flank marches or those made parallel to the enemy's front, depend very much for their successful execution on the nature of the intervening terrain. The interposition of a mountain range, or river, or other obstacle of considerable extent, will usually, when joined to celerity of movement, make such operations safe. When this protection does not exist, great care is required in preserving such formations and dispositions as to resist a sudden flank attack, and particularly in patrolling the intermediate ground and in occupying those points favorable for such an attempt, by sufficient numbers and in sufficient strength to guard against surprise.

(d) As exemplified in general by the Germans, in their tactical operations of 1870.

When the Germans entered upon the war of 1870 they had been trained in "applied tactics," a term meaning, as generally understood, the application of battle formation to all kinds of ground, and there was no injunction more carefully laid upon them, or that had been more thoroughly impressed by practice in field manœuvres and battle drills, than this; that in the attack they should take every advantage of the ground consistent with effective action, and that the destructive fire of the modern breech-loader made this imperative; and when, in subsequent combats, this rule was departed from in a marked degree, attention was called in orders to its non-observance.

The education of the Prussian army for this campaign consisted mainly in practical examples as opposed to abstract theories, and one of the most essential parts of it for all, from the corps commander to

to the private in the ranks, was the cultivation of the "eye for ground," so that on every occasion, the arm and tactical formation best suited to the terrain could be quickly determined and used; and by this wise use of the topographical features, joined to a proper appreciation of the situation, perseverance in the attack was to ensure success.

This careful training gave to the Germans a remarkable degree of superiority in the combats which took place in either broken ground, or enclosed country; as, for instance, in the six days' fighting which preceded the capture of Le Mans, January 12th 1871, and in the wood and village combats which were of such frequent occurrence throughout the war.

Careful reconnoitring previous to the attack was required, because, particularly in broken ground, a direction once taken by troops in dispersed order was difficult to change. On the defense,—it was contemplated by the Germans, however, that they should always assume the offensive,—old rules were to apply; consequently the best position was considered to be heights, or grounds somewhat elevated above the surrounding surface, sloping gently to the front, and with good natural protection for the flanks. In those infantry engagements which took place on broken ground, or in woods, company columns, with skirmishers well to the front, were used to guard against surprise; and because, in combats on ground of this character, the tactical units became as at Fröschwiller very much disorganized, it led to the belief that it would prove beneficial to include in their course of instruction thereafter, the handling of troops belonging to different organizations thus accidentally brought together. (Boguslawski).

The borders of woods and villages, rather than the interior, proved to be the most important parts to hold; this especially because the breech-loader made cover more desirable; and, as a consequence, in the villages, where disinclination to leave cover was observed, caused the contests at certain points to be disadvantageously prolonged.

The noted cavalry charge at Mars-la-Tour, August 16, was made on ground favorable for this arm, and the attainment of the desired object, the retention of the French army, was by this heroic act greatly assisted. On unfavorable ground, the cavalry was withdrawn when the infantry advanced to the attack; but in their extensive and generally most effective patrol duty, as well as in the examination of the country, a duty especially enjoined upon the divisional cavalry, even very broken ground was not avoided. The lancers on broken ground, against cavalry armed with the chassépôt, proved entirely inefficient.

As to the artillery, previous reconnoitring, which was had in most cases, enabled it to avoid impracticable ground and to select favorable positions. At Sedan, the artillery of the 5th and 11th Corps pushed forward over difficult ground and deployed even in front of the advance guards; and at Vionville, the artillery of the 9th Corps took position on open ground in front of the infantry, whose watchful care prevented its loss of guns, and when the infantry advanced, the artillery moved in turn to its support.

The contests for dominant points upon the battle-field, because of the greater power and consequently wider command of modern artillery,

were frequently very fierce and difficult to decide. "The mitrailleuse was ineffective on troops under cover." (Boguslawski.)

As to the lines of investment of Paris and Metz, they were, as is customary, accommodated to the configuration and nature of the ground; but heights were taken in, even if near the French lines; "villas and chateaux were converted into fortresses, and woods into impenetrable obstacles." Abattis, placed within easy range, was extensively used in woods and on broken ground. Rifle pits were carefully located in reference to the configuration of surface; on the heights, so that no dead angle protective to climbers could exist; on low or level ground, so they could not be looked into; and they were so disposed as to connect the improvised fortresses above described, and which formed the supports. Trenches or barricades closed the entrances to villages. Park and garden walls were carefully prepared and furnished with block-houses and tambours at the angles; and an obstacle of this kind running through a wood was considered of great value.

The Meuse River was dammed, and arrangements were made to flood the level country adjacent. Hills and woods afforded positions from which to cannonade safely the French outposts. On account of the enclosed nature of the suburban country, and the advantage taken of the terrain in the investment, there appears to have been no space left available for effective employment of troops engaged in a sortie.

II.—ANALYSIS OF TERRAIN IN ITS RELATIONS TO MILITARY OPERATIONS.

(a) *Mountains and Rivers,*

A mountain range parallel to the line of march is an aid to an invading army, and perpendicular to it an obstacle; in either case the main condition being the possession of its defiles; for if these are held by the defenders then, in the former case, the invaders' line of communications is in danger, and, in the latter, his advance is seriously delayed. As mountainous districts are sparsely settled, the roads, besides being difficult, are few in number; transportation is thereby hampered and movements cannot be accurately timed; and as such a country is unfavorable for cavalry, reconnaissances are seldom as thorough as desirable.

A defensive force posted at many points of a mountain range, its parts being thus isolated from each other, invites the assailant to break through at any desired point; and if the range is of small extent and well guarded, the position will very likely be turned instead of directly attacked. By the natural protection afforded for its flanks, and the narrow front on which a direct attack must be made, a force can usually hold a given point against great odds; but the narrow practicable spaces of mountain summits do not as a rule permit of many troops being assembled at isolated points, and and if it is found necessary to endeavor to hold the entire position, or mountain barrier, the best direct defense appears to consist in occupying the principal passes by echeloned field works so arranged as mutually to protect each other. Such a system would leave the greater part of the defender's army free to oppose a flank or turning movement, and the

the existence of field works would go far toward avoiding that condition of defeat expressed by Napoleon, "In all combats in mountain passes, the columns once broken are thrown into confusion upon each other and fall into the power of the enemy." Napoleon also considered it a mistake "to make the principal attack in a mountainous region abounding in strong positions favorable for defense."

The actual or direct defense of barriers of this kind is in any case a difficult and uncertain problem, and particularly so because a strong demonstration upon the fortified position is so often successfully used as a mask to a turning movement, and the assailant's main force reaches the defender's territory without opposition.

Probably the best course is not to attempt a direct defense, but, holding the main army at suitable positions in rear, to occupy the passes with small detachments, which, by careful observation and such opposition as they are able to offer, serve to give warning to the enemy's approach, and then to attack his columns as they debouch from the defiles.

Similarly to a mountain range, a river entering the enemy's territory is a natural line of invasion, and forms a flank support for the invader's army; while perpendicular to the line of march, it is an obstacle to a degree depending upon its breadth, depth and rapidity of current.

The two general classes of rivers are those contained in narrow valleys, and others which traverse broad valleys or plains. As a rule, the banks of the former class are in many places thickly wooded and intersected by ravines, consequently the points favorable for crossing are numerous, and good cover is afforded the assailants both during the passage and on reaching the farther bank. A disseminated line of defenders would offer but weak opposition; hence, as in the case of a mountain range, it would probably be best to make a similar use of small detachments, and occupy with the main army suitable positions in rear of the river and from which to fall upon the enemy's columns with forces superior to those he could assemble at any point.

Those rivers which traverse plains present a very different problem. Their direct defense is easier for various reasons; existing bridges are protected by field works; an attempt to lay pontoons or to construct any other kind of bridge, is more easily observed, the usually greater breadth of these rivers prevents the most effective use by the assailants of their infantry until, when approaching the defender's side, they are exposed to a converging and most destructive infantry fire, and it is difficult, on account of the broad curves of a stream so situated, to find a point of crossing such that a superior concentrated artillery fire will fully protect it.

Moreover, the roads usually found in the near vicinity of such rivers, facilitate concentration of the defender's forces, and villages and tributary streams present excellent flank positions whereby the assailants, if the crossing is effected, are obliged to fight under very unfavorable circumstances.

A most judicious and safe disposition of the defender's army is one which permits of a force double that of the invader's to be brought

against the latter at any point of passage ; and in estimating the interval that may be allowed between the parts of any army guarding a river, so as to ensure this concentration of superior forces, it may be well to note that it usually requires at least five times as long a period to construct a bridge under fire as it does in a course of instruction.

On the side of the offense, numerous islands and wooded banks facilitate bridge laying, by making observation and defense more difficult, and would facilitate the adoption of the plan usually followed ; that of making a demonstration at one point and crossing at another, thereby endeavoring to avoid the great loss incident to a direct attempt in the face of the enemy's main force. A very important condition to success is that the nature of the terrain on the defender's side shall when reached afford both room and cover for deployment, and for continuing the attack.

Supposing a passage of either a mountain range or a river effected ; then, in the former case, the situation of the invader is much safer, as he can advance without being exposed to flank attack, and if defeated has a line of retreat that can be easily guarded, two conditions non-existent in the case of a river.

A line of railroad at a suitable distance from and parallel to either mountain range or river, would obviously be of great assistance in the attack or defense.

Natural agents here exert their power in a remarkable degree ; heavy snows render mountains impassable, while severe cold makes rivers passable at any point.

The control of a mountain range or river and their defiles constitutes a powerful lever in the hands of an expert commander ; and the passage of either on the enemy's flank, or in his rear, is always followed by serious consequences.

(b) *Marshy Tracts.*

If of considerable extent, marshy tracts present greater obstacles to the assailant than broad rivers of the plain. Aside from the difficulties attending the construction of a passage way, it is next to impossible to drive the defenders from their position by superiority of artillery fire. The crossing is somewhat favored if dry patches exist here and there, still the advance must be made on narrow fronts exposed to converging fire. Frost, or an extremely dry season, may intervene to favor the passage, and so may a heavy rain to make it impossible. If the passage is successfully made, there is not, as in the case of a river, a bridge in rear requiring protection ; but on the other hand, there is no effective artillery fire to cover a retreat.

(c) *Woods.*

Woods offer concealment to army movements, strengthen lines of defense, and to some extent protect the occupants against the enemy's projectiles ; but they prevent effective employment of artillery and cavalry, and, in general unity of action. As the defender must observe every movement of the enemy in order to make proper dispositions to meet the attack, it follows that a feature of this kind either in his front,

or covering a portion of it, is a great disadvantage. He should be either along or in the prolongation of its outer border, or in front of it, according to the configuration of the ground; in any case, being so located in reference to it, that it may serve to conceal part of his own forces if necessary, or as a cover for retreat in case of disaster. On the part of the assailant, if an extensive wood or forest is met with in the vicinity of the enemy, and it is traversed by several roads or is otherwise practicable, it may assist him in effecting a surprise; but ordinarily, streams, heavy undergrowth, or deep ditches, exist here and there, and, except in low lands, ravines and rocky patches are generally quite numerous; besides it is seldom that a description of the location and extent of these obstacles, sufficiently exact for rapid or combined movements, is obtained. The defense of a forest against the enemy's advance could be similar to that of a mountain range, or of a river in a narrow valley, heretofore described. Warning of the approach of the enemy's columns would be obtained by small cavalry detachments thrown well forward into the forest, and, if there are suitable roads, it would be accompanied by sections of horse artillery, while battalions of infantry guard each of the main issues. From 1000 to 1500 yards in rear, is assembled a strong force of cavalry and horse artillery as a support, and for use in contesting the issue from defiles not otherwise guarded, while the rest of the army is concentrated on favorable ground still farther to the rear, in one or more masses within supporting distances of each other, and near the prolongation of the enemy's line of operations, or of its own line of retreat. Such dispositions would in ordinary circumstances, it is believed, invariably lead to a successful defense.

The result of a contest in the interior of a forest or wood, and when the odds are not very great, is very uncertain to either side engaged, because of the obscurity which veils the main attacks, and the difficulty in securing unity of action. There should be no half way measures in this case; at the critical moment, either the defenders should retire simultaneously to the open country, or, better, push forward with the greatest audacity and determination, which effort would ordinarily meet with success.

A wood of moderate extent, situated in front or on the flank of a position, may exert a powerful effect in either the attack or defense. It is a most valuable aid to the defense, if the edges exposed to attack are strongly occupied; and, whether they are straight or irregular, a disposition of the forces similar to that made in the case of a regular fortification, and a like preparation of the front for effective fire and for preventing the assailant's freedom of movement, would make the wood impregnable, or at least so difficult to gain that an attempt would be warranted only by very urgent circumstances. Its possession by the assailant gives him a most effective support to renewed assaults, as it is usually just as difficult to drive him from it as, in the first instance, it was for him to gain it.

(d) *Plains.*

Plains, or gently undulating and comparatively open country, are usually, as already stated, the scenes of the greatest battles. This is

mainly due to the ease with which on such ground large masses can be moved, and because the commanding general can personally observe the various dispositions and local results, and can order in his reserves as occasions demand, thus in some cases, if needed, causing his entire army to take an active part. Terrain of this description is most favorable to concentration, and lends itself to a ready establishment of preponderating strength at the decisive point. The demoralizing effect of uncertainty as to the enemy's movements peculiar to a close and difficult country, is absent and cavalry can join in the pursuit and render victories more complete.

An open country as a rule hastens the conclusion of a campaign; but it may retard it if the weaker side is superior in good cavalry and artillery, and its forces possess greater mobility; if the enemy is not skillful in handling large masses within narrow limits; if water courses and accidents of ground divide the open country into several fields of tactical operations in area proportional to the several forces available; and when the defender possesses fortified places or retreats, into which he is not to retire except in extremity, but near or in rear of which he can seek shelter in case of need, and whence he can issue at an opportune moment. The defender can then, by isolated, vigorous attacks, reduce the disproportion in strength until a fair equality exists between himself and the enemy.

To manœuvre an army properly either on the offensive or defensive in a country of this description, partly open and partly covered, occupied here and there, and intersected by streams of various dimensions and series of ridges or hills of moderate elevation, requires military ability of the highest order, and an intimate knowledge of the terrain and its relation to military operations is absolutely indispensable.

(e) *Communications.*

Railroads, ordinary roads and rivers are the three general classes of communications. Railroads, strategically considered, exert powerful effect in the concentration of armies at desired points in the theatre of war. As a means for supply of men, horses, subsistence and other stores, and for transportation of the wounded they are considered as an indispensable adjunct in modern warfare. They are prompt in service, and in a measure dispense with a fixed base or dépôt, by enabling supplies to be drawn from cities located in different parts of theatre, and in different directions from the scene of operations. In our Civil War there were notable instances of their value, among which were the various transfers of troops between the eastern and western fields of operations, and the supply of the armies engaged in the Atlanta campaign; and through similar facilities afforded in the Franco-German war, they were the means by which the Germans were enabled to keep their large army continually on the move and at work driving the French into disadvantageous positions.

Ordinary roads are still, however, the principal routes for army movements, and the only ones in the enemy's vicinity. They are therefore of the greatest importance and require the greatest care in des-

cription as to location and condition, in order to ensure the success of combined movements and to facilitate tactical dispositions in general.

Rivers are especially valuable as aids to transportation when the line of march is parallel to them, and both banks are held by the side utilizing them for this purpose,

(f) *Positions.*

Certain conditions of the terrain offer on the battle field, or to an advanced or rear guard, or an outpost, special advantages of position in the attack or defense.

The principal requirement in battle is that the position shall be commanding, in the sense of securing effective fire and observation of the enemy's movements; and, of secondary consideration, though very important, that it shall afford protection to the occupants. Comparatively level ground for actual occupation by the main line, with the front sloping gently downward toward the enemy, strong flank supports, and sufficient depth and cover in rear for the reserves, and for transfer of troops as needed from one point to another of the line of resistance, are the essentials of a good position. There should be no natural obstacle in front of such an extent as to prevent the defender from promptly assuming the offensive; but a position is strengthened by natural or artificial obstacles in front of comparatively small extent, such as patches of woods, ditches, orchards and farm-yards with their stone-walls or other substantial enclosures, buildings if strongly constructed, in fact, any features which can be held by a few men, and force the assailant to deploy under unfavorable conditions, and cause him to expend a greatly disproportionate amount of strength in securing possession of it. "Advantageously disposed ground can compensate for inferiority of numbers to such a degree, that, when the attack has become enfeebled by continuous unsuccessful effort, the defenders can take the offensive with good chances of final victory." (Derracagaix)

To attempt a position of such strength, a frontal flank attack, or turning movement, would in general be resorted to; hence the need of strong flank supports. These may be natural obstacles, such as a river, marsh, or inaccessible heights, or ground affording extensive artillery command, so as to compel the assailant in his turning movements to make a wide detour, and thereby separate his forces to such an extent as to give the defender the opportunity for taking the offensive before a concentrated attack can be made. It may be added that in the absence of natural obstacles, the alternatives are either to intrench strongly and provide artificial obstacles, or to keep special troops in reserve for making a counter attack.

Another requirement of a good position is that it shall be proportioned in extent to the number of troops occupying it. Because of the great power of modern armament, fewer men than formerly are needed to repel the front attack; but as a turning movement would ordinarily cause a prolongation of the line of resistance in this direction, a deep formation is still necessary. No strict rule can be laid down as to the number of men per lineal unit, as this depends upon the nature of the

terrain, character of intrenchments ; and other considerations ; but, as a general rule, in ordinary ground and including the reserves, four per yard, a number corresponding to the results of experience in recent wars, may be taken as a basis for calculations.

The terrain in rear of a position should offer successive lines of defense ; and, in any case, free movement of all arms to provide for the event of retreat. In view of the latter contingency, a river with few bridges would be a serious obstacle, while a forest traversed by known roads would prove a valuable aid in checking pursuit.

Heights do not in general afford suitable positions. They require a considerable detachment of the main force to hold the base ; in fact, the retention of the latter is usually an almost absolute necessity ; artillery fire from the main position diminishes in effect as the assailants approach the base, and, if the slopes are steep and the front of attack extended, it is practically ineffective as against the ascent. Isolated heights and very prominent or conspicuous points or objects within the line of defense, detract from the value of a position, in that their ready observation by the enemy assists him in directing his movements and in estimating ranges. Even in the construction of ordinary trenches, the soil thrown to the front should be covered by brush or by whatever is growing in the vicinity, so as not to attract attention.

For the advanced guard, vantage ground for observing the enemy for the purposes of attack, and which in case of repulse can be defended for a sufficient length of time to permit the arrival and deployment of reinforcements from the main column, are favorable conditions.

For a rear guard, the position should be exceptionally strong in its front and on the flanks, and afford an effective use of artillery at long ranges. An impassable obstacle in its front, or one that contains defiles through which the enemy must issue, is here of great value ; and the nature of the terrain on the flanks should be such as to make a wider detour necessary in an attempt to envelop them. Because in a turning movement on either flank the pursuers gain a considerable distance towards the main column, the next position selected for the rear guard should, if possible, be such as to offer a natural obstacle on that flank. Since an engagement by the rear guard with the enemy is solely for the purpose of gaining time, and it is important that as great a display of strength as possible should be made, the extent of a position, relatively to the strength of the force, may be considerably greater than that prescribed for a battle.

Positions for outposts should afford a commanding view of the surrounding country and obstacles to easy approach by the enemy. As one of the principal duties of outposts is to guard against surprise of the main army, the position selected for defense in case of attack should offer such facilities as to prevent, as far as possible, a retreat until the flanks are turned ; and, to this end, all defiles, roads and bridges leading to it from the front are to be made impassable. Those positions of ground are most desirable which will enable the sentries to observe any movements of the enemy and afford concealment for themselves, that will give the pickets free front and lateral communications, to the

supports the best mutual defense, and will permit the outpost, as a body, to maintain itself against attack until it has fulfilled its duty as a guard to the main army.

(h) With reference to the Fire-effect and the Special Arms.

Accident of ground and other topographical features, that afford a free field of fire to the occupants and shelter from the enemy's fire, are of great advantage in securing good fire effect as well as in diminishing loss, to either skirmishers or participants in the main line of battle. The former can usually change the direction of their advance sufficiently to the right or left to gain this advantage ; but the latter as a rule, must move directly forward, take the ground as it comes, and make the best use of it possible. Supports and reserves always avail themselves of such cover as the ground affords, consistently with maintaining useful positions relatively to other troops.

While trees, rocks, walls, ditches, or other prominent objects, are frequently encountered in the advance and serve the required purpose, and usually available cover consists of inequalities of ground, the men so disposing themselves in the hollows, that they can have a good view of the enemy over the summits immediately in their front. On flat ground, which however is of infrequent existence on the battle-field, the only protection available is evidently due to diminishing the size of the target for the enemy, by kneeling, or lying down, and preserving intervals ; and in a lying down position, very slight inequalities give valuable cover. On ground higher than that held by the enemy, the men naturally occupy the farther edges of the summits.

Cover thus taken during those phases of an action which permit of it, undoubtedly conduces to the best fire effect, as the men, by the protection given, will be less nervous and can therefore aim better and select their targets with more discretion. " A rational tactical disposition consists in augmenting the effects of one's own fire, while sheltering one's self as much as possible from that of the enemy." (Lewal.)

Experience in war shows that a general alignment and preservation of the space assigned to an organization, during an advance to the attack, is all that can be relied upon or expected ; for it is obvious that to secure the advantages of cover above described, the sinuosities of surface formations and the irregular dispositions of different features, will cause parts of the line to be somewhat ahead or in rear of the others, also a grouping of men at vantage positions ; but this should not diminish the fire effect, in fact a cross fire of groups is more effective than the direct, individual fire of the same number of men ; excellent control may be had of these accidental formations, and the better cover at such points will, in regard to the enemy's fire, frequently compensate for the advantage in this respect due to extended intervals.

At short ranges, impenetrability of cover, diminished targets and preservation of intervals are, in general with probably but one exception, the only conditions for diminishing loss ; this exception is due to the natural tendency that most men have in firing down a slope to aim too high, the projectiles thus passing over the heads of the advancing

troops ; while the latter, who have the opposite tendency, fire low and hit either directly or by ricochet.

At long ranges, the curvature of the trajectory is to be considered in connection with configuration of surface. Evidently where the trajectory does not rise above the surface a distance exceeding the height of the target, the dangerous space, the space within which an object is likely to be hit, is continuous ; when normal to the surface, the dangerous space is reduced to a point and variations of surface between these limits produce corresponding changes in the extent of this space. Supposing the firing point and target to be on the same level surface, and plane of fire accurately determined—then, because the curvature of the trajectory gradually increases with increase of range, the dangerous space correspondingly diminishes—and if the target were at a sufficient distance, or if instead of being on the same level, it were on the near slope of a distant hill, it is plain that the dangerous space might be reduced to a point ; whereas if the target were on the far slope of the hill, provided the latter conformed in direction to the course of the trajectory, a very probable supposition in the case of ordinary hilly ground, it could be hit at any point of the slope. Also in the case of a flat summit at a distance, and higher than the firing point, the latter could be so located that the trajectory, just grazing the near edge of the summit, would create a dangerous space entirely across it.

A single trajectory only is considered, but the results are similar for any number fired from the same point, as in volley firing ; and, as the location of the firing point, as well as the choice of a target, which the defender likewise has, are always within the power of an assailant, it follows that a practical acquaintance with the relation of the trajectory of the particular rifle or gun in use to configuration of surface for different distances and elevations, is needed in order to obtain the best fire effect that the ground will permit.

As to the special arms, infantry has the advantage of the greatest freedom of movement when all conditions of the terrain are considered ; cavalry comes next in this respect, but if the ground is unfavorable for its action, it is of little use unless dismounted, when, so far as its equipment permits, it becomes practically infantry ; and artillery is last, but this arm is efficient wherever its guns can be brought into action.

The relative proportions of the special arm required in a particular case to ensure the greatest general efficiency is consequently governed to a great extent by the nature of the terrain. Thus in a moderately hilly and partially covered country, which is suited to all arms, normal proportions would be adhered to ; if close and difficult, thereby preventing freedom of movement, the cavalry would be diminished, and if it also abounded in strong positions and natural obstacles of considerable extent, then to secure sufficient destructive effect, the artillery should be increased.

Because the effectiveness of an arm is thus governed, a force especially strong in a particular arm should, if possible, select such ground for an encounter as will favor its action ; and similarly if the enemy's chief strength lies in the preponderance of a special arm, ground un-

favorable for its action, but suited to our own, would be selected ; by this means compensation is often had for a considerable inferiority of numbers.

As to infantry ; in the attack the terrain is particularly favorable for the action of this arm if there are natural approaches to the defender's position, such as a succession of hollows or ravines intersecting the front, or the ground passed over is undulating ; if it is enclosed by fences, stone walls, or embankments, with cuts, or ditches ; or contains other minor features, which, while not obstructing the view, or fire, or seriously interfering with attack formations, will by the protection against the very destructive effect of modern fire-arms, in some measure counterbalance the advantages in this respect possessed by the defenders. It is evident that the freer the front may be of such features, the more effective will be the fire of the defense ; and it may be generally stated that as regards infantry, an enclosed country is best for the attack, and open country for the defense.

Cavalry, on the contrary, would be hampered in its movements by the enclosures above described, and as a rule such cover would be inadequate either as a screen from view or as against fire, moreover comparatively level ground is best for the charge ; therefore a fairly level, unenclosed and partially covered country is better suited to its effective action. To take advantage of such features as will screen its advance until near the vicinity of the enemy, or charging distance, is reached, and thereby enable it to effect a surprise, is now generally conceded to be indispensable to its successful effort against battle formations of the other arms. In either attacking or holding a defile, or in action where obstacles of ground impede its progress, cavalry is usually dismounted and fights as infantry ; and, if thoroughly trained for such an emergency, it could no doubt render as effective service in this respect as the mounted infantry was called upon to perform in our Civil War. It is unnecessary to state that in general reconnoitring service, raids and pursuits, and in protecting the advance and retreat of our armies during this war, difficulties due to the nature of the terrain seldom prevented the prompt accomplishment of a given task.

As artillery can make no direct seizure or capture of the enemy's forces, its destructive effect is the main consideration ; hence, ground which favors this effect in the highest degree is the best suited to its action. A position is very desirable which commands by effective fire the ground within range, over which the enemy may approach, and that slightly dominates that held by the enemy's batteries. Against front attack, this arm can usually protect itself, but its flanks are vulnerable, and failing the support of the other arms, a natural obstacle is needed for their protection ; and water, or soft ground, or a slight sharp descent in front, is useful in catching the enemy's projectile and thus preventing their ricochet. Cover for the enemy within 1000 yards of the guns is a disadvantage. As prominent and conspicuous objects catch the eye, and their ranges have probably been measured by the enemy, their vicinity is to be avoided ; as are also such points as have a distinct and well-

defined background, against which by contrast the smoke of shell explosions is readily observed. As reverse slopes that nearly conform to the curve of trajectories are dangerous to horses and ammunition, caissons should if practicable be moved to the rear of the flanks. Very elevated positions are unsuitable as they prevent the full effectiveness of flat trajectories, and require an advanced position of the guns which brings them into full view; and for like reasons in the defense of a ridge, the lower spurs are much to be preferred to the principal summits. A most valuable consideration is that such concealment should be afforded, as to enable a battery to come into action before being observed by the enemy.

In the preliminary and final stages of cavalry combats, and especially in open ground, horse artillery takes a very prominent part; also in reconnoitring, when further progress is impeded by the enemy's cavalry or infantry holding a defile or other defensive position, or by a considerable force in the open. This arm then either dislodges the enemy, or by containing him, enables the cavalry to turn the position. Similarly, in rear guard combats, it takes a most important part in holding defensible positions until outflanked.

As, in the attack, artillery has in general to conform in its movements to those of the arm with which it acts, there is often but little time that can be devoted to securing advantages of ground; the best that offers must be seized quickly and with a view above all to obtaining the best fire effect, hence the value of a quick eye for ground as a qualification for every artillery officer.

III.—CONSIDERATIONS AS TO THE NECESSITY FOR A KNOWLEDGE OF THESE RELATIONS.

In every theatre of war, prominent intersecting topographical features whether natural or artificial are under certain conditions, either supports to a position, or serve as defensive lines; they conceal a position, or make it difficult of access, and cover deployments and movements of troops as well as protect them from the enemy's fire and from both infantry and cavalry attacks. For one side, they are aids; and for the other obstacles which prove the more serious the more unexpectedly they are encountered.

A field of operations presents manœuvring tracts or spaces of various extent, lines and isolated points, of which the gain, or preservation, or loss, marks either the progressive or retrograde character of the contest, a success or a check for either side; and from their intimate relation to and effect upon the different operations, are all important factors of the final result. "Configuration of ground is one of the most important elements that enters military combination or calculation." (Home). The duration of the resistance mainly depends upon the selection of favorable sections for special manœuvres and dispositions, and upon such an employment of the troops as shall be suited to the terrain.

At the beginning of every campaign, an effort is always made to concentrate a numerically superior force against the enemy; a few days or even hours delay, due as it almost always is to unexpected

natural obstacles, can produce very disastrous results ; to the elements of time and distance must then be added that of terrain ; and the commander who in the special case, is acquainted with this element and can most skilfully combine it with the other two, will have the advantage at the contest. A most minute knowledge of the terrain, at the point of concentration of the separate columns, is of vital importance ; strong positions must be secured or, by the occupation of those beyond, put out of the reach of the enemy ; in case of his previous occupation of them, the roads or routes by which they can be turned ; and in general, an intimate knowledge is needed of those locations where the least difficulty and the fewest natural obstacles will be met with, and where the operation will be most likely to prove successful.

It is particularly in a moment of this kind, and when preliminary knowledge has not been gained, that any one having as "eye for ground" and facility in representing and describing it, can render his commander invaluable service.

After the first encounter, and when it is incumbent on one side to give way and seek a new position, then an exact knowledge of practicable routes will serve to reach that position before the defeated force can do so, or to drive the latter to unfavorable ground.

In the case of two armies marching parallel to a stream, one defending it and the other striving to effect a passage, exact information as to practicable crossings and nature of the banks, is of great assistance to either side.

The importance of knowledge of the terrain extends to all commands from that of an entire army to the smallest fraction engaged. It is very marked in cases of isolated divisions or brigades, because as a rule, they do not possess many facilities for surmounting obstacles which are encountered in their movements ; and in case of an outpost driven in, or a patrol forced off its previously assigned route, great advantage will ensue if its commander is well acquainted with the practicable routes and defensible positions, which will aid in either delaying the enemy's advance, or, where retreat is imperative, diminish the dangers of pursuit.

While a knowledge of practicable routes is indispensable, it is the natural defensive power of a country that grows in importance in the endeavour to retain possession of it. Every plan of defense is based upon the probable duration of the resistance along certain defensive lines and at certain points, on the nature of which rests in great measure the strength and degree of excellence of the entire position ; and due appreciation of local resistance also governs the proper disposition of the reserves.

The enemy desiring, in place of a frontal attack, to turn a position, a thorough knowledge of the country enables the defender to judge with what degree of success a turning movement may be effected, and to act accordingly. This knowledge is, in the same case, equally important to the enemy, for although seemingly impassable or very difficult obstacles are surmounted, he may find himself so situated, in regard to both the terrain and the enforced separation of his forces, as to invite defeat in detail by a defender who knows how to profit by his opportunities.

Acquaintance with the terrain in rear of troops forced to retreat is indispensable. Armies retire nearly always by the route followed in the advance; but smaller bodies, isolated corps, divisions, etc., sometimes find it judicious, or they are constrained to choose another route; and a perfect knowledge of the ground will aid in diminishing loss and checking pursuit. "It is much better to reconnoitre ten routes too many and which are not used, than to neglect one and thereby suffer loss." (Soltyk.) It is only by this knowledge that a rear guard can check the enemy without suffering great loss, if not annihilation.

In the pursuit; if a beaten army does not suffer still greater disaster, it may usually be attributed to the lack on the pursuer's part of clear information as to the locality of defiles of all kinds which are on the route of retreat, particularly the bridges, the destruction of which may seriously compromise the safety of the retreating army. Marked sinuosities of the route often favor a simultaneous flank and rear attack, and positions may be seized of such strength and so situated as to compel the already exhausted retreating army to break through with great additional loss in order to reach its destination. Even Napoleon himself after the battle of Borodino, where he had failed to employ his own officers to that extent customary with him in obtaining accurate information of the country, owed much of his losses to the use of badly executed maps, while the Russians, although less skilled in its application, possessed this information fully.

During a temporary suspension of hostilities, the nature of the terrain within the field of operations, in reference to future movements, becomes a matter of primary importance and should be an object of special study, exclusive, and conducted with great care by officers specially detailed for their ability in this work; and information as to those parts which cannot be visited is to be gained from residents or persons whose occupations would presumably make them acquainted with the country.

It is unnecessary to say more in evidence of the necessity for a knowledge of the terrain; whether the knowledge shall be of a general or special character, depends as shown upon the plan under consideration; it exists in every military operation, and military history shows that a lack of it has led to the gravest disaster.

IV.—REMARKS UPON THE MEANS FOR OBTAINING INFORMATION AS TO THE TERRAIN.

The commander of an army cannot see everything with his own eyes; he must rely for much information upon the reports of his subordinates who should be sufficiently exercised in both observing and describing what they observe, in order that the commander shall always have, at the right time, that knowledge of the terrain which is so indispensable to the successful execution of a properly conceived plan.

General information as to the topographical character of a country may prove sufficient in strategical operation, but those of a purely tactical nature require more detailed information, because, in the latter case, the troops are frequently obliged to leave the main routes and to

move in various formations in confined localities, for considerable distances, and where local obstacles might seriously interfere with combined movements, in regard to both time and direction. This need becomes greater as the distance to the battle-field diminishes, and is imperative on the battle-field itself. While an army, on account of its means and facilities for building bridges, might find a deep and broad stream a comparatively slight obstacle, it would be a serious one for an isolated battalion, and the converse would prove true in marching over a difficult road, hence, to provide for every emergency, it would be best, in any case, that information should be as detailed as possible.

The best minute representation of a tract is afforded by relief maps, where due attention has been given to contouring, for they appear with perfect clearness to the most unpractised mind; but such means are too cumbersome for field use, and are best retained at the seat of the government. The next in order and adapted to every occasion are carefully constructed topographical maps which, to any one who has been taught practically how to prepare them, should lead him into no error in the general adaptation of tactical dispositions to the terrain. In these maps, so far as possible, nothing that effects military operations should be left to the imagination; and to prevent errors in reading, a uniform method of representation should prevail both at the government bureau and at all schools of instruction. As an aid to the conception of a plan of operations, a map of this kind might prove even superior to actual observation of the country, because errors in perspective, which in the field cannot be avoided except by long and continuous practice, are obviated, and there are no obstacles to an extended view. Drawn to suitable scales, parts of the country, from the entire theatre to a scale of say 1-4000,000 down to small tracts to a scale of 1-50000, the most valuable information of a general and special character may be conveyed for all operations of both strategy and tactics.

But no matter how comprehensive and truthful maps may be, they cannot replace reconnaissances made during the campaign to obtain information of the terrain; even if of a recent date, the time devoted to their preparation is sufficient to include many changes, natural and artificial. Frosts, heat and moisture as well as art are continually at work with additions and curtailments of the various features, any of which may seriously affect a military operation; and the enemy is also busy in creating obstacles, such as destroying bridges and making roads impassable.

The time may come in this, as it has in other countries, when important changes in the terrain, not including those of a purely temporary character, may be kept track of and noted on our official maps; but, although some slight effort is made in this direction, the military necessity for exactness of detail does not appear to be generally appreciated.

The three general methods of reconnaissance during a campaign are by horizontal projections, vertical projections and verbal descriptions; the first are represented in the well-known class of topographical sketches, in which the configuration is given by contours or hill shading, and the other features by conventional signs: the second, in

perspective drawings, or by what are often termed outline or profile sketches; and the third, in itineraries. These are used singly and in combination, and each of them has now a valuable adjunct in photography. It is not within the scope of this essay to enter into a description of any of these methods; but some remarks are deemed necessary.

For military purposes, verbal descriptions of nearly all topographical features are very valuable, and are frequently needed to supplement maps or sketches. This is fully recognized in foreign services where itineraries of trips made at home and abroad, in time of peace, are preserved; and officers are frequently specially detailed to prepare them. Such means are within the power of every one possessing military education and if the itinerant can sketch well, so much the better, as a greater amount of information is then obtainable in a given period.

One of the best methods for keeping fairly up with the constant state of change is to procure the latest topographical map of the country or region visited, and to note thereon the changes as observed, a process which is also sometimes applicable in the progress of a campaign. If the scale of available maps is too small for the purpose, then the following plan may be adopted: Make an enlarged extract from the map, to convenient scale, of that portion of the territory to be described. For localities not named on the map, adopt a system of nomenclature, which might be as follows: Roman numerals for tracts bounded by the main and minor road or routes; letters for the roads, heights, woods, etc. Supposing this to be undertaken during service in the field, the officer in charge of the work will furnish each of his subordinates with a copy of the extract, or so much thereof as pertains to his assigned task, and will also designate the route to be followed and the points where the party will assemble from time to time. If necessary, a special report will be made on the condition of the roads, while the details of the intermediate terrain may be described as follows: "Sections I, II and III are wooded and impracticable; IV is cultivated land, mostly wheat-fields enclosed by fences, contains a few ponds without inter-communication, ground is firm; V and VI are open and hilly, contain a few detached wooden farm houses, ground is firm and stony; VI, VII, VIII and IX are flat, contain patches and clumps of trees, are intersected here and there by brooks and ditches, ground is soft and impracticable for artillery except by very few roads; at centre of IX is a series of bare and rocky elevations, etc." The individual descriptions completed, they are then combined in map form by one or more of the most skilful officers, who also make such additions or changes as may be warranted by the information available. During this field work, all features should if possible be represented by their conventional signs, and the verbal descriptions, when they will not obscure the map, are best written on the representations of the objects referred to, viz.: along the border of a wood, "thick undergrowth, impassable except for infantry"; along a road, "corduroyed, in good condition, practicable for heaviest wagons"; on a slope, its degree of declivity from different points, etc.

It is not expected that such a representation will be scrupulously exact, or complete; but it should contain no vital defect, and should

comprise those details most important to the proper conduct of the advancing army. A very important consideration is that this preparation is within the power of any one conversant with the effect of topographical features on tactical dispositions.

On the side of the defense, the features particularly necessary to describe are those which have an important bearing on the special situation. As a rule, the defender is in possession of good maps, but if these are not as full as desirable, the general method above described may be followed. The enlarged extract, on which the more minute details are to be represented, should contain the water-courses, marshy tracts, hill-ranges; in fact all those features which by their location or direction may serve as defensive lines or points, and their exact location and condition must then be carefully shown in detail. Successive lines of defense and their practicable connecting routes are of vital importance. Should there be but one line of defense, then such positions in its rear as have natural supports for the flank, and the rallying points, with the intercommunicating routes, must be represented. Important items to include in the hasty sketch of a position, and which are not as a rule described in works on military topography, are the range of view and the free sectors of artillery fire; the former may be indicated by a dotted line representing its limit, and the latter by right lines drawn from each point selected for the guns and limiting the sectors.

As no one can fight and sketch at the same time, parties engaged in this duty require proper protection by escorts; in fact, to gain a commanding point of view, or to examine some important detail in the enemy's vicinity, a severe skirmish may be neither an unlikely or needless event.

It may be said that no army in the world possesses a sufficiently large general staff, or engineer officers in sufficient number, to attend to these special duties; and even if it had, then, as Von Schellendorf ingeniously remarks, "it should not be forgotten that to call upon officers of the special arms to take part in reconnaissances, is only affording them the greatest pleasure." Recourse must then be had to line-officers of the different arms, and in general to infantry and cavalry lieutenants; and it is probably best that it should be so, because their familiarity in handling troops on different kinds of ground, and experience with other tactical requirements, should better fit them for the work. It would be in the interests of the service to teach a few non-commissioned officers, selected from each regiment, topographical sketching and itinerary work, preference being given to those who desire to remain in the service.

The graduates of a cadet military school are usually possessed of the theory of military art joined to an excellent technical education in topography, but lacking practical instruction in minor tactics, for which time and opportunity are not usually available, it cannot be expected that immediately on graduation, these acquirements will fit them for map reconnaissance in an active campaign. The special aptitude demanded is the prompt appreciation of topographical conditions which affect the particular tactical object to be attained; hence, the necessity for thorough instruction in the field, in time of peace, in the details of

minor tactics which teach the relations of terrain to tactical operations. Even a verbal report unaccompanied by a sketch, but made by an officer having this prompt appreciation, would frequently prove of more value to a commander than a highly finished map constructed by one not possessed of it. Faithful representation of ground, prompt execution and careful finish are not all the requisites. Prompt execution is very essential on account of the limited time available; but, to be most useful, practical work in minor tactics is needed, that attention may be called to those points, lines and positions which determine the tactical importance of the entire terrain, and that a valuable report may be turned in to the commander. An officer on this duty should know what to omit, and that embellishments not only cause a waste of time but actually injure the map by obscuring important details. Napoleon, who had a well-organized topographical corps, did not require that work turned in should be very exact, but that important errors should not be committed; that the task should be promptly performed; and that there should be sufficient data on which to base his general operations. When time was very short, verbal descriptions only were required, from which sketches were subsequently made.

Many battles have been lost by lack of proper appreciation of this subject, by not taking proper means for becoming acquainted with the terrain of the battle-field. This importance is increasing with progress in the development of tactics, and is equally felt by all the participants, from the commander-in-chief to the officer in charge of a patrol; and it is necessary that such rules and regulations shall be adopted and enforced as will prevent any neglect of this extremely valuable part of a military education.

V. MEANS FOR ACQUIRING A PRACTICAL KNOWLEDGE OF THE SUBJECT.

(a) *What foreign armies are doing in this respect.*

The new infantry drill regulations for the English army provide for a course of company field training which has for its object the cultivation of the "eye for ground," and prescribes among other details of instruction the following: "The tactical deployment of the company in action; movements in battle formation on a road, a plain, and in an enclosed country; the attack and defense of a position, a defile, and a wood;" the several movements of skirmishing and of attack formation "to be practised first in detail, and then on varied ground, *the object of each being pointed out*" (the italics are the writer's). In addition to practice in the construction of hasty intrenchments, the "elements of defense of posts to be explained on the ground, where facilities exist, comprising improvised obstacles, the principles of the defense of banks, hedges, ditches and walls. Security and information; conduct of the advance guard on a road, a plain, entering a village and approaching a defile;" and similarly for the rear guard. After an explanation of the object of "reconnoitring, comes the exercise in it consisting of "reconnoitring a defile, wood, village and river; ordinary patrols by day and night, in close and open country; flanking patrols,

surprises and ambuscades." The details of outpost duty, including positions of the sentries and pickets with reference to the ground, and preparation for their defense; this practice also at night. All the details of camp life to be taught practically. All ranks are instructed, every available officer, non-commissioned officer and man, with the exception of soldiers of more than 17 years' service. Every company is required to undergo one month per year of this training, and during that month leaves, and furloughs are not granted to its members. The scheme for each exercise is based on a definite supposition carefully prepared beforehand, and, having first been explained, is carried out as far as possible, under the conditions of actual warfare. To insure thoroughness of instruction, a searching field examination, the details of which are prescribed preferably by a general officer, is held at the end of the course by the battalion commander, who also furnishes his opinion in writing as to the zeal and ability displayed by each officer; and the general officer is also required, when circumstances will permit, to be present at both the training and examination, to supervise and test the merits of the former, and, in the latter case, that he may better be enabled to add his "own opinion as to efficiency of the officers concerned and their qualifications for promotion."

During the field manoeuvres, for which large bodies of the regular army and the militia are usually assembled, the exercises in attack and defense are devoted largely to inculcating a clear and comprehensive knowledge of the terrain in its relation to the prescribed operations.

In the Italian army, company drill in the attack formation is based upon the principle laid down "that it is far better to work so as to suit the ground than to seek to maintain regular and symmetrical formations;" and that no symmetrical formation has a chance of success which is not simple and will not bear that mingling of men, which is and must be incident to every advance over rough ground, especially if the advance is in extended order." The first object sought on the offensive is "to feel the enemy and get acquainted with the ground and the state of affairs. In the advance to the attack, cover is to be used when available; on open, level ground, the men are to throw themselves down at the end of each rush;" the number of ranks and the intervals between files in the line of supports to correspond in extent to the nature of the terrain,—the more open, the less the number of ranks and the greater the interval.

The fifth paragraph of the German drill regulations is as follows: "Training on the drill-ground must be supplemented by frequent exercises on all kinds of ground. When the condition of the fields make such exercises difficult at the more favorable seasons of the year, then the late autumn and the winter must be utilized for this purpose;" and it is further prescribed that exercises of small commands united so as to form one of full war strength, are to be carried on in the country as well as on the drill-ground at all seasons of the year.

The autumn manoeuvres of the German army have for a special object the instruction of different corps in adapting their dispositions for attack and defense to all kinds of ground. In observing these exercises,

the writer was strongly impressed with their close semblance to actual warfare. Beginning early each day, when two corps of a strength of about 20,000 each are assembled in their assigned positions, all the details of a pitched battle succeed each other and without cessation until the recall at 3 P.M., when the different commanders are assembled and their respective dispositions criticised either by the emperor or a general officer designated by him. The movements are characterized by vigor and energy; special attention is given to the proper selection and occupation of ground by all arms, and particularly by the artillery that its effect may be the greatest possible.

France, Russia, Austro-Hungary and Italy as well as England and Germany, have their yearly manœuvres, which cannot fail to increase the efficiency of their armies in adapting their movements and tactical dispositions to the terrain.

(b) What our Army is doing in this respect.

It would not be just to say that our army has been entirely idle in this respect, and that at the different posts "order arms" and "carry arms," "fours rights" and "right front into battery faced to the rear" have been the invariable rule and the limit of instruction; but it is not very far from the truth. To be sure there has been target practice besides, most thorough in itself, but that this exercise, where facilities existed, has been accompanied by instruction of the men in taking advantage of the ground while performing it, is not believed to be the case. The proper use of the ground in this respect is by the way, an important part of the course in the principal foreign schools of musketry instruction.

The field manœuvres of comparatively large command which took place in 1889, were very instructive, and it may be safely said that many of the participants learned more in regard to the proper disposition of troops in reference to the terrain, and which would prove of value in war, than they had previously acquired during their entire service.

Indian scouting and campaigning is a special branch of military art, in many respects, distinct from any other, and, like all other branches, requires much practice to acquire proficiency. In this occupation, in which fleetness of foot is a special requirement, the troops receive a most thorough training in marching over all varieties of country, and at times undergo extraordinary privation. Encounters which have taken place between the troops and Indians, when the former were under a commander experienced in this kind of warfare, have usually shown throughout the contest a marked ability on each side in taking advantage of the element of terrain; probably the only exception of note during the past twenty years, on the part of our army, being the Modoc campaign and the battle of the Rosebud. In the former, there seems to have been a lack of appreciation of the full defensive power of a natural fortification of such extraordinary strength as that which the Modocs held; and in the latter, the annihilation of the command was probably due to a want of knowledge of the ground held by the Sioux, and which

enabled them to surround the troops, rather than to tactical movements which had hitherto proved unsuccessful.

It cannot be safely predicted that Indian wars have ceased in our country; hence, if for no other reason than to save the hundreds of lives which might again be sacrificed under similar conditions, it is obligatory upon all who may have these lives in their keeping, to make a careful study of the element under consideration, both as to its bearing in Indian warfare as well as in contests with civilized nations.

(c) Instruction.

To ensure the successful accomplishment of a given task, the facilities afforded must be adequate; and, when these are not available, great care is necessary in selecting from such sources as are available those which shall the most nearly ensure success.

In studying the relations of terrain to military operations, experience in actual warfare is undoubtedly the best instructor; but its cost makes it entirely out of the question. Next in value and in logical sequence is its study under those who have had this experience, and who are able to impart their knowledge, the instruction to include practical exercises having as close a semblance as possible to actual warfare. The third in order is instruction by those who, although inexperienced, continue to be careful students of facts as well as theory, and who likewise can describe what they have learned, to be also accompanied by practical exercises. Failing in these methods, the alternative is attentive reading of standard works on military art, including grand and minor tactics, illustrative campaigns and battles, joined with an endeavor to realize, as far as possible, the effect of configuration of ground in modifying various conditions of the different operations described, and such practice as may be had in military topography.

Except on special occasions when a considerable number of troops is assembled, as during the manoeuvres of 1889, it would be difficult to have pertinent illustrations of the principles of strategy; but at every army post, where at least two arms of the service are stationed, field exercises in both grand and minor tactics may be had; and at all the posts, the latter subject can be drawn upon as a never failing source of most valuable instruction and of endless variety; and, aside from the benefits to be thus derived in exercise of the proper adaption of troops to the terrain, it would, as a means of discipline, serve to arouse interest in the profession where the monotony of adherence to drill regulations alone would tend to destroy it.

It is possible that the proposed new drill regulations may when adopted be modelled in its prescriptions upon the plan accepted as a necessity by the military nations of Europe, and contain such exercises only as may be needed in actual warfare; if so, then it will serve in combination with minor tactics and efficient instructors, to place our army in such a condition, in regard to this vital ingredient of a professional education, as shall enable us to compete on at least equal terms with any foreign army that might be brought against us.

It is astonishing what little value theoretical instruction may have when unaccompanied by practical illustration. Two instances will show

it, and in each the officer charged with the tactical dispositions had passed through a thorough course of theoretical instruction in minor tactics. In the formation and disposition of an advanced guard in a country easily practicable and well adapted to surprises, no other precautions were taken to guard the flanks of the columns than the flanking patrols, 150 yards on either side of the route as is customary in open country; and, in the other case, a cavalry charge, beginning at 350 yards from the enemy, was made along a narrow road upon a relatively equal force of infantry occupying the near edge of a ravine which intersected the road at right angles, and whence a direct and oblique enfilading fire was had upon the approaching column. It is presumable to suppose that the criticism made by the instructor at the close produced a salutary and lasting impression which long study of the text had evidently failed to do. It is evidently far better that such lessons should be learned during a course of instruction than in a campaign, at great sacrifice and at the risk of imperilling the safety of the entire army.

As to the kind of practical instruction needed for the army in order to acquire a knowledge of the subject; the different formations and movements prescribed by drill regulations, which, aside from exercises pertaining to ceremonies, are here presumed to conform to the needs of war, are to be practised so far as possible under all conditions and circumstances that are sure to be met with in active operations. Facility in assuming the necessary formations being first acquired on the drill ground, the troops are then to be conducted, in front attack and changes of direction, over all varieties of the terrain that are likely to be met with in the different phases of battle, and each unit carefully instructed how to take advantage of them for cover and to reach the enemy. By the employment of two parties representing the assailant and defender respectively, and causing them to change places during an exercise, the advantage to either of certain peculiarities of ground and of the dispositions required to suit them will be more fully appreciated. The proper handling of supports so that they shall, by taking advantage of the ground, be nearer the main line and therefore the sooner available, is of special importance.

These exercises should actively include all present, and in such manner that each shall be usefully employed and have a well-defined object in view; and they should be sufficiently deliberate to afford time for appreciating the value of the different positions. As the men of our army are now composed of a more intellectual class than heretofore, the instructor should clearly explain the reasons for each special formation or disposition, in order that the necessity for it, or for any special exertion on their part in a particular case, may be apparent and tend to increase their interest. Throughout the exercises, command of the troops and order must be carefully maintained; to which end, the drill regulations must be adhered to, so far as the nature of the terrain will permit.

The great value of these exercises lies in the cultivation of individual judgment, of skill, and of a habit of quick decision in adapting troops to the terrain, and in promptly estimating the relative values of positions and seizing those that are of vital importance to success.

The remarks heretofore made under "Fire effect" are sufficient to show the value of combining instruction in firing, whether individual or collective, with a study of its relations to configuration of ground; and the following from Mayne's "Infantry Fire Tactics," and which are the views of excellent authorities, indicate the kind of instruction desired for the effective use of small arms.

To secure a good fire effect, the men having been taught "to adjust their sights and fire quickly while aiming fairly well," the officer in command must necessarily understand how to control the fire to the best advantage; a qualification requiring practice "on varied and, if possible, unknown ground."

"Let us use fewer cartridges in training men to attain accuracy of individual fire, which has not in war the great importance usually attached to it, and make use of them rather in teaching the leaders the employment of fire." (Simonds.)

"Field firing proper on varied and hilly ground is of the greatest value of all, as it accustoms men more to the realities of war than anything else; it also affords instruction in inclined fire."

"The considerable influence that the form of the ground exercises on the effects of fire, impose upon all armies the duty of exercising its infantry on all kinds of ground, and not, as is generally done, on flat ground, alone." (Brialmont.)

"Field firing, when properly carried out, is worth all the rest of the musketry instruction put together."

It is not here intended, by the above quotations, to belittle the intrinsic value of extreme accuracy of infantry fire, for evidently, if it could be combined with proper adaption to the ground, the result would be perfection; besides, a few men are needed as sharpshooters; but it is generally recognized as the result of experience, that it is impracticable on the battle-field to continue target practice as elaborated on the range. A fair degree of accuracy only is attainable; multiplicity of details in sighting, if insisted upon, would not only seriously delay but confuse the men; moreover target practice as taught, independently of governing conditions of terrain, would frequently prove ineffective. True appreciation of distances and a knowledge of how to adapt fire to the configuration, especially on the part of the officers; and a fair degree of accuracy joined to exercises in which the men are shown the value of these factors, are rational means for producing the required result. In regard to artillery, similar instruction in reference to the ground is needed. As to target practice for this special arm, while not efficient unless accompanied by such instruction, it is usually practicable to employ great accuracy on the battle-field; time to aim and relative position permit deliberation, and the very long ranges require it. At short ranges, however, as in advancing to the attack or in repelling a charge, inability to aim with much care exists; hence with accurate target practice should be combined fair but quick aiming as well as exercises in adaptation of fire to the ground.

"In order that reconnaissances, which now more than ever before are required to examine ground for the determination of relative values

of positions, shall fulfill their object, subordinates must be practised in them during peace that they may quickly judge of these values." (Derrécigaix).

It is not an easy matter to develop, even by practice, the necessary ability for executing a good military map reconnaissance, but facility will come by perseverance. It is not supposed that the student will become expert enough right away to superintend an extensive reconnaissance. It is very essential that he should proceed methodically by beginning with the simplest problem and working himself up through those of increasing difficulty until he is able to recognize and describe defensive and offensive positions and lines of however complex a nature, to finally include the important features of a field of operations; and, above all, bearing continually in mind the necessity for rendering an intelligible and comprehensive report of his work.

Practical exercise in it is to be had at every army post, and a certain period could be assigned for instruction under an experienced officer. For cavalry officers, upon whom commanders of armies will in war in great measure depend for special information as to the terrain, extensive trips lasting from one to several days could be made from their posts; during which time the information required, whether of a general nature, or involving some special hypothesis as to the military situation, would be obtained by sketches and verbal descriptions; and the work would be subsequently commented upon by the instructor. For the infantry officers, these trips would be of more limited extent; and if their work is to differ in any way from the preceding, it may be a more detailed description of those features which specially affect the use of their own arm. It would be of value to the service if certain non-commissioned officers, or privates, selected for their fitness, should take part in the work. It is easy to see that exercise of this clinches the information derived from books, cultivates an aptitude for seizing favorable places for advance and for selecting points to attack, and gives confidence to an officer suddenly called upon in the field for invaluable information; moreover the results of extensive work of this kind are important for future reference at the seat of government.

As standard text books are in general the only available source of information as to the pertinent principles of strategy, some means for emphasizing the instruction are advisable; and to make the lessons of certain value, essays, having for their subjects the concrete application of these principles, as for instance, to American campaigns, could be written and then commented upon by an experienced and competent instructor,—the student taking notes of such comments. The interest that is awakened by such a method needs only to be observed to be appreciated. In these studies the important topographical features to be considered are now; first those which form or in any way affect principal lines of operations, special attention being paid to railroad centres and fortified places, which, after the enemy's principal masses, are the objectives in a campaign and assure freedom of communication;—then the intermediate and transverse routes; and, finally the accidents of ground and military positions; and on the defensive;—"the great

lines of invasion, which usually correspond to the principal railroads; the main routes entering the territory in less dangerous directions; the ordinary roads in hilly sections; defiles, necks and passes on the frontier, which might enable the enemy to turn certain defensive positions; and, in the interior, the important railroad junctions and the defiles traversed by the main railroad lines." (Derrécagaix)

In grand and minor tactics and military topography, theory should be joined to practice, in order to make the instruction tangible and of a real value, and to impress with a thoroughness that cannot admit of doubt the relations of terrain to military operations.

Among the best works on grand operations, which include the present subject illustrated by examples, are Clausewitz "On War," Hamley's "Operations of War," and Derrécagaix' "Modern War,"—representative works of the three great military nations; and on minor operations, Shaw's "Elements of Modern Tactics," and Clerly's "Minor Tactics." These with Home's "Précis," Von der Goltz' "Nation in Arms," Von Scherff's "A Study of New Infantry Tactics," and Boguslawski's "Tactical Deductions," contain most valuable information pertaining to the present subject. In "Battles and Leaders of the Civil War" are very pertinent examples, and the "Official Records of the Rebellion" are replete with apt illustrations, which can readily be sifted out and arranged for students' use.

CONCLUSION.

The importance of the subject cannot be too strongly impressed. There is hardly a general principle of either strategy or tactics, or an order that is given by a commander-in-chief distant from the place of execution, which does not require some modification due to the nature of the terrain; and the proper application of the principle or execution of the order must then depend upon the ability of the commander present with the forces to adjust his tactical dispositions to suit this requirement.

The importance which Napoleon attached to a clear and accurate knowledge of the terrain is evidenced in the fact that, previous to the execution of a plan of operations, he entrusted the examination of territory to his most eminent general officers; and his instructions as to the proper mode of conducting it are well worthy of careful study. Von Moltke also, in a few years immediately preceding the war of 1870, made it a special duty to gather more detailed information of the French territory than was contained in the latest topographical maps; his emissaries traversed the entire region for this purpose, and the result of this work was that "portfolio of maps," which enabled him to make his combinations and dispositions so near perfection.

The German and French armies from their experience in 1866 and 1870 respectively, recognized the fact that their training in adapting battle formations to the terrain had been very deficient, and that radical changes were needed to correct the fault; and there are few officers now living who commanded troops in our Civil War that cannot, from their own experience, recall instances when, in the execution of their plans, inattention to the effect that some peculiar features

of the terrain would produce, led to disastrous results ; and on the other hand, when a proper value had been attributed to it, that this element alone, and not infrequently, decided the victory in their favor.

The progress now making in military art, the remarkable improvements in the effect of fire-arms, the employment of larger armies and the consequent need of greater skill in handling them in marches as well as on the field of battle, so that mistakes of conduct shall be reduced to the narrowest limits, make paramount the cultivation of that discernment which enables not only the most favorable time for acting to be selected, but also the most advantageous place for its performance.

Decision, common sense and the knowledge of governing principles and how to employ them are the qualifications of the consummate tactician ; practical exercises develop these qualifications ; and, in applied tactics, where the judgment is continually exercised in determining proper dispositions for attack and defense as governed, on the one hand, by regulations in which relative positions and distances are laid down with more or less exactitude, and, on the other, by modifications thereof required by the nature of the terrain, is found a field most useful and effective for their development ; and practice, in which the handling of troops and study of the relations of terrain to military operations are joined, will invariably lead to the most perfect tactical dispositions.

NOTE.—In preparation of this essay all available sources have been resorted to for information, among which may be mentioned :

Battles and Leaders of the Civil War.	Mayne's Infantry Fire Tactics.
Baden Powell's Cavalry Instructions.	McClellan's Own Story.
Boguslawski's Tactical Deductions.	Memoirs ; Grant's, Sherman's and Sheridan's.
Clausewitz on War.	Pratt's Field Artillery.
Clery's Minor Tactics.	Shaw's Elements of Modern Tactics.
Derrécagair' Modern War.	Von Schellendorf's Duties of the General Staff.
Drill Regulations of Different Armies.	Trench's Cavalry in Modern War.
Von Hohenlohe's Letters.	Unger's Reconnaissances Militaires.
Home's Précis of Modern Tactics.	War of the Rebellion, Official Record.
Jomini's Art of War.	
Marryat's Field Training.	

NEW MEMBERS.

Rank.	Name.	Corps.
Life Members.		
Major, Nawab Bahadur ...	Afsur-i-Jung, ...	Comdg. Goleonda Brigade.
Ordinary Members.		
Captain ...	Aplin, P. J. H. ...	17th Bombay Infantry.
Captain ...	Baddeley, C. E. ...	R. E.
Major ...	Brunker, J. M. S, ...	R. A.
Lieutenant ...	Burne, W. H. ...	Royal Sussex Regiment.
Lieutenant ...	Cockerill, G. K. ...	28th Punjab Infantry.
Lieutenant ...	Douglas, J. A. ...	2nd Bengal Lancers.
Lieutenant ...	Drummond, E. J. ...	2-2nd Gurkha Rifles.
Captain ...	Fleming, J. M. ...	S. C.
Captain ...	Geoghan, T. P. ...	3rd Bombay Cavalry.
Colonel c. B. ...	Grant, H. F. ...	Asst. Adjutant General.
Maj.-General	Lewes, H. C. ...	Inspector General of Artillery in India.
Lieutenant ...	Mealey, A. G. ...	19th Bengal Lancers.
Lt.-Colonel ...	Melliss, H. ...	S. C.
Colonel ...	Mortimer, F. J. ...	Deputy Inspector General of Ordnance.
Lieutenant ...	Napier, Hon. H. D. ...	C. I. Horse.
Maj.-Genl. c. B.	Stedman, E. ...	Qr. Mr. General in India.
Captain ...	Thwaytes, E. O. ...	24th Madras Infantry.

UNITED SERVICE INSTITUTION OF INDIA.

CATALOGUE OF BOOKS.

ADDENDUM No. 4.

Section.	No.	Subject.	Author.
G.	59 (b)	Asia Minor and Armenia ...	Barkley.
G.	105 (c)	English intercourse with Siam	Anderson.
H.	87 (f)	Rulers of India. "Clyde and Strathnairn ...	Sir Owen Burne.
I.	75.	Records of Geological Survey of India Vol. XXV Part I. 1892.	O.
M.	118 (a)	Letters on Cavalry ...	Prince Kraft.
M.	141 (a)	The Swordsman	Capt. A. Hutton.
M.	416 (a)	Modern Cremation ...	Sir H. Thompson.
M.	416 (b)	Sanitary Measures in India in 1889-90	Official.
M.	498 (a)	The Volunteer Question ...	Various. (West of Scotland Tactical Society Prize Es- says.)
M.	560 (b)	The Principles of Strategy	John Bigelow.
M.	609 (a)	Military Sketching ...	H. Hutchinson.
M.	629 (a)	Report on Horse Breeding in Hungary	Major D. Dawson.
M.	634 (a)	Stable Building and Stable fitting	Girard.

NEW MAPS.

Map of Southern Zambezi. Scale 25 miles = 1" } Received from the
Do. Equatorial Africa do. 60 miles = 1" } Director of Military In-
Do. Persia do. 16 miles = 1" } telligence, War Office.

The Journal
OF THE
United Service Institution of India.

VOL. XXI.

1892.

No. 93.

A MUSKETRY SIGNALLING DUMMY,
By Captain DU MOULIN, Royal Sussex Regiment.

So much time is now devoted to practice on the range, and such large numbers of men are, in a British regiment, always ready to spend an odd hour trying to improve their shooting, that every plan by which time can be saved and musketry rendered less irksome is eagerly sought for by musketry instructors. Every officer who has spent many consecutive hours at the firing point, has doubtless observed that a considerable amount of valuable time is taken up in the actual signalling (i. e. waving of discs) of the value of the hits. Moreover, mistakes now and then, owing to the register keepers failing to at once perceive the waving discs, are almost unavoidable. These mistakes are the cause of errors and consequent initials on the registers, and result in the subsequent addition or deduction of a number of points. It is a well known fact that the eyes of those who are most often on the range are better trained to the movement of the signalling discs by the markers, and they are accordingly less liable than others to make mistakes, but it is not everyone who is thus trained, and a non-commissioned officer, who probably has not had many opportunities for practice, is very prone to mistake an outer for an inner, or *vice versa*, through his not distinctly seeing the disc.

It is, therefore, obvious, that the introduction of some mechanical system of signalling shots, which would be simple, comparatively inexpensive, easily worked and fitted up, and capable of exhibiting the value of the shot so that no mistake is possible, is greatly to be desired. Another advantage which is desirable, is some means of signalling, by which the value of the shot may remain exposed to view for some little time. Under the present disc system a wave of the disc is given by the marker, and all is over, there being nothing by which the register keeper can confirm his probably hasty glance at the marking disc.

A description, therefore, of an apparatus for signalling shots, which was successfully tried at the Meerut Central Meeting in December 1890, may perhaps prove of interest. The idea of this apparatus was gathered from a description of the signalling arrangements at Wimbledon by an officer who had been on duty there, and from the movable shutters of Begbie's signalling lamp.

The signalling appliance at Wimbledon consisted of a frame the same size as the target, divided into four smaller frames, each containing a shutter pivoted horizontally and bearing a figure painted on one side. Each section on the ranges contained one target and one signalling frame, which were worked on the "up and down" or "sash window" principle. Thus, the marker, when a shot was fired, turned the shutter,

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exposing the figure giving the value of the shot, and pushed up the signalling frame, which remained in view until the target again appeared with a spotting disc in the bullet hole.

The disadvantage of this arrangement is, that the signalling frame remains in view for a short space of time, and that it cannot be used where two targets are fitted on the up and down system, and that the marking frame and spotting disc are not in view together. The marking frame which was in use at Meerut can, on the contrary, be fitted to any system of targets, whether on the sash-window or the trolly principle whether single or double targets are worked, and whether fixed or movable targets are used. In addition, the frame showing the value of the shot remains in view until the next shot is to be signalled: thus any discrepancy in value between the marking frame and the spotting disc can be seen at any time.

Fig. 1 shows how the apparatus appears, when viewed from the firing point. The frame is somewhat about the same colour as the background, the stop butt, and as the wood is not of any great width, the square which contains the figure giving the result of the shot, in this case a bull's-eye, is very distinctly seen. The signal is allowed to remain in view until it is necessary to show the result of another shot, when it is changed. If the second shot was a bull's-eye the shutters are opened and closed again, showing another 5. If the shot was a miss the shutters are opened and remain so, thus showing nothing on any of the square.

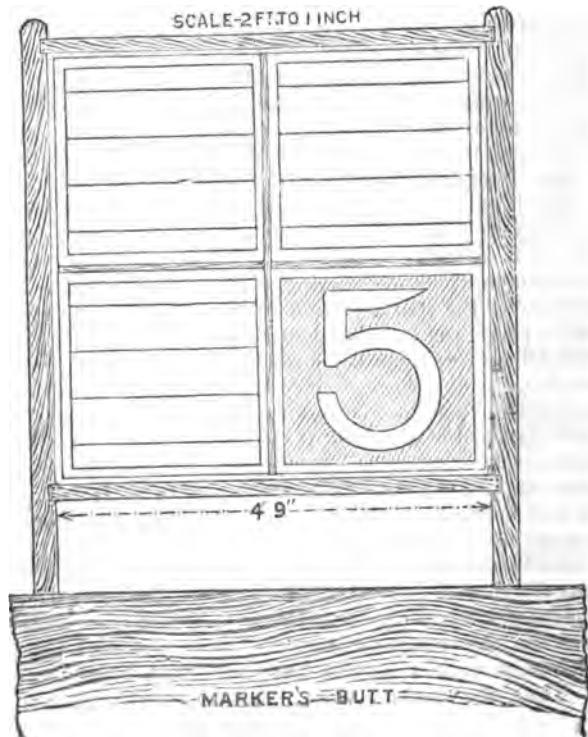
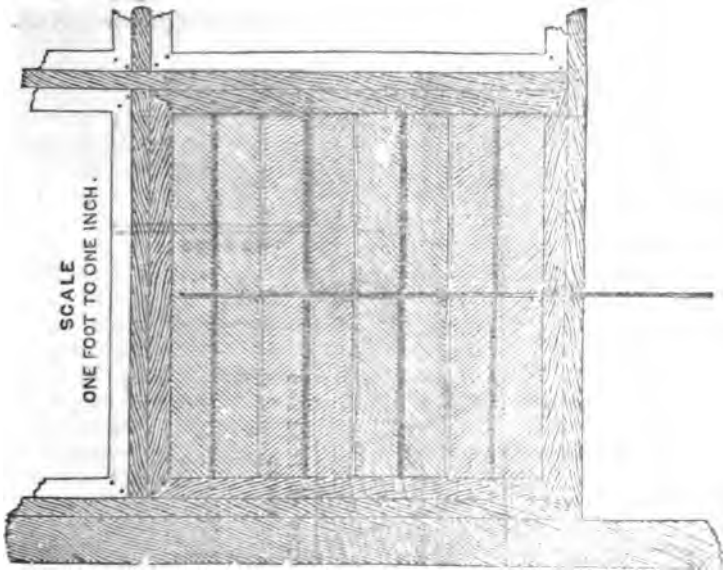


Fig 1.

The following is a full description of the apparatus—Two poles, 18 ft. long, sunk two feet into the ground, support a wooden frame 4 ft. 8 in. square, with one foot of space between the markers' butts and the bottom of the frame (see Fig. 1.) This frame, 4 ft. 8 in. square, is divided into four smaller frames 2 ft. 3 in. square, which each contain four sheet iron jilmils or shutters 2 ft. by 6 in. pivoted horizontally into the sides of the frame. At the back of the frame each of these shutters is connected to an iron rod, which extends down into the markers' butt. (see Fig. 2.) By the up or down movement of these rods the shutters are closed or opened. When open, the shutters, being horizontal, are not seen, but, when closed, a white figure with black background appears, giving the value of the shot fired, as in Figure 1. Each of the four shutters bears each a different figure, 2, 3, 4 or 5, and their normal position is horizontal or open, when nothing is seen.

Fig 2.



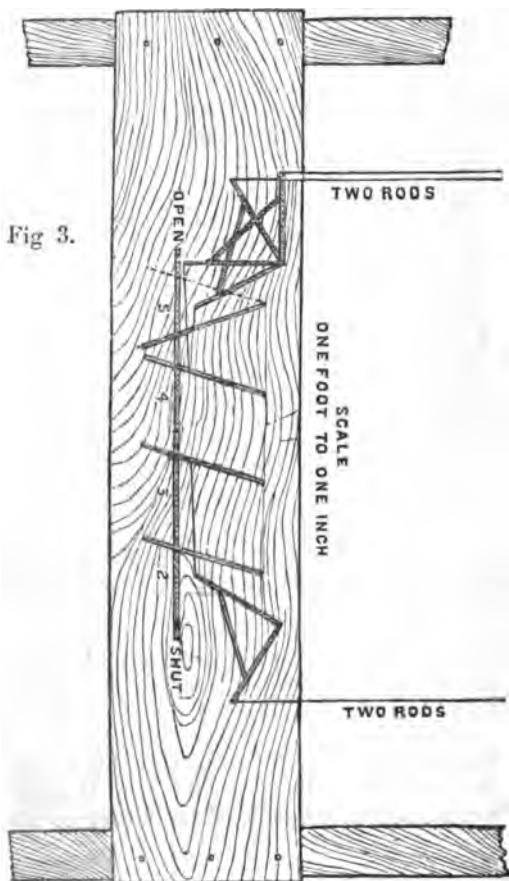
In order to signal, the shutter is closed as the target is being run up or out as the case may be. The register keeper sees the value of the shot, and the firer sees also the position of his shot by the position of the spotting disc in the bullet hole.

In the butts the N. C. O. who keeps the record of hits works also the closing and opening of the shutters. This is effected in a very simple way by a crank and lever to each shutter, the lever being fitted with a handle.

The four handles to the four levers are placed in a row, each bearing its number, 2, 3, 4, or 5 (in order that the N. C. O. may not make a mistake), and a movement of a handle three inches to the right closes.

the shutter and signals the shot, while at the same instant the target is run up or out with the spotting disc inserted in the bullet hole.

In Fig. 3, which represents the levers by means of which the N. C. O. in the butts works the apparatus and signals the hits, the four levers are shown in position, three being in the normal position of "open," one being shut, and thus causing a 5 to be shown on the signalling frame overhead. The rods fitted to the shutters are each connected with a crank bolted to the board shown in the sketch, two of these cranks being on the right and two on the left of the levers. Owing to these being in pairs, one above the other, the position of those on the right cannot be very clearly shown in the sketch, but on the left each crank is in view, owing to the under one having been worked to signal the 5 on the signalling frame. This is more distinctly shown in Figure 4. In order again to have all the levers pointing the same way, the shutters on the left of the frame are closed by being moved downwards, while those on the right are closed by being moved upwards. The handles move to and fro in slots, which are provided with stops at the proper intervals.



In Figure 4 the levers which work the signalling shutters 4 and 5 are shown on an enlarged scale, both levers being at the "open" position, the cranks and connecting rods being one behind the other. The dotted lines show the position assumed by the lever, crank, and rod on a bull's-eye being signalled.

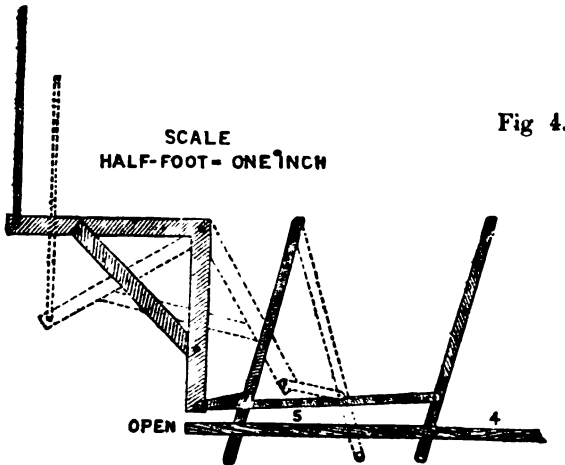
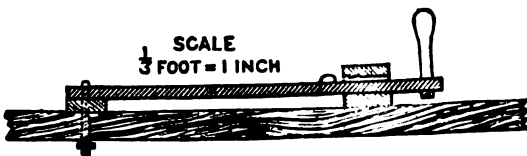


Figure 5 which is drawn on a large scale gives a section of the lever, showing the handle. All the ironwork composing the levers, the cranks, and that forming the slots was made out of half inch bar iron, a quarter of an inch in thickness. The connecting rods to the shutters were of rod iron a quarter of an inch in diameter. The jilmils, or shutters, were of sheet iron, two feet by six inches; a piece of rod iron being rivetted along the middle to give stiffness to the shutter; and the ends of the former projecting one inch at either side, formed the pivots upon which the shutter worked.



The whole apparatus as in use at Meerut was valued at about ten rupees. It was constant use during the meeting and was approved of by the competitors, and especially by the register keepers, who preferred it to the usual method of waving discs. No difficulty was experienced in seeing the closed shutter, even at 900 yards, as, although at this long distance the figures could not of course be seen with the naked eye, yet the dark spot in the corner of the frame caused by the shutter being

closed was easily discernible, and the competitors soon learnt to know that the dark patch in the top left corner meant an outer, while that in the bottom right corner meant a bull's-eye. With the glasses the figure could easily be seen.

It is advisable, however, that the frames should be made about three feet square, in order that they may be more easily visible at the long ranges.

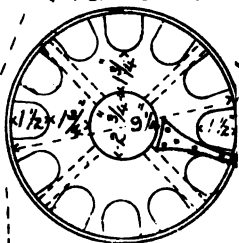
There is no necessity, either, for the rods which work the shutters to have cranks fitted to them. A simple wooden handle by which each rod could be moved up and down would be quite sufficient, a stud on the board would also be required, fitting on to a projection on the rod, so that, when at the normal position of "open," the rod would be held by this stud, whilst, to signal, the rod would be moved clear of the stud and would drop, or be pulled, down until the shutter closed.

As regards the signalling of misses and ricochets, the former would have, for the annual course and for practice, to be shown by the flag on the signalling frame, the direction being shown at the same time. For match firing when the direction of misses is not shown, it would not be necessary to show any signal at all, the shutters on the frame simply remaining open and the target being exposed to view without any spotting disc on its surface.

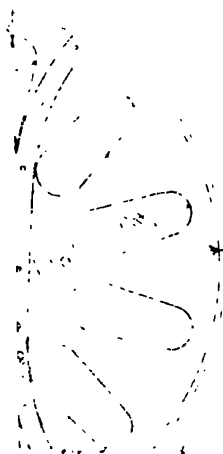
Ricochets, however, would have to be shown as at present, except that the red flag would be waved in front of the lower half of the signalling frame, the shutters being all in the open position.

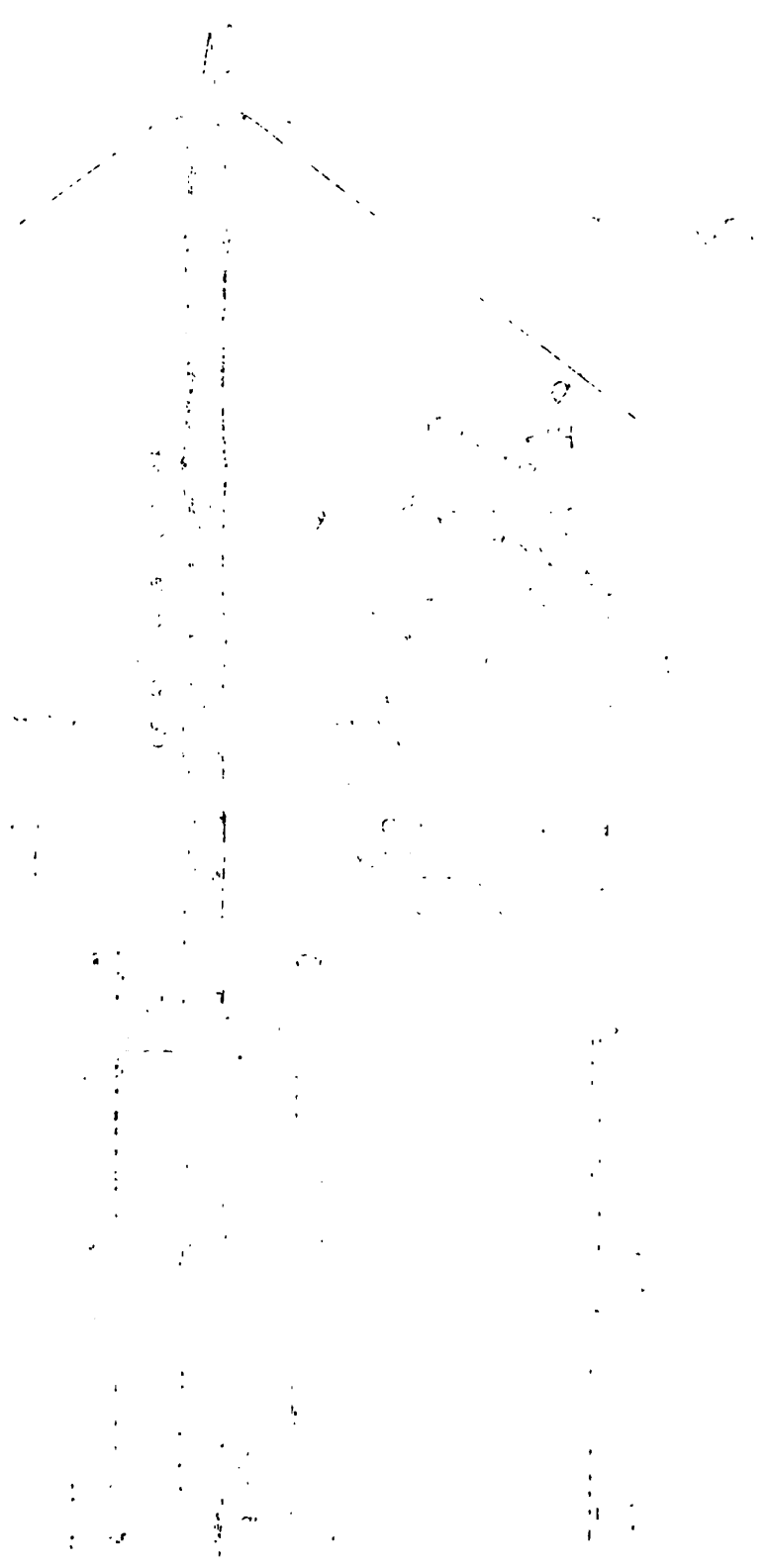
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Plan at 'B'



(Showing Locking Ring)

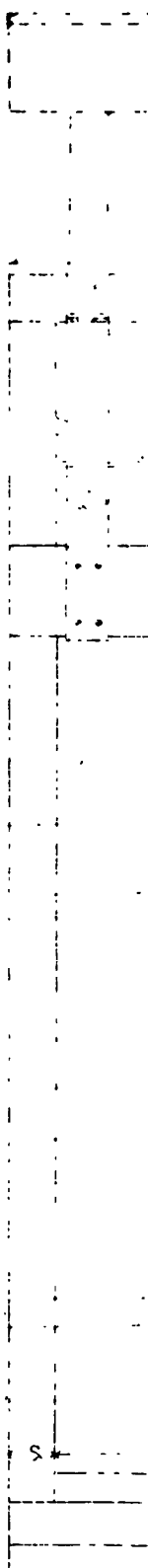
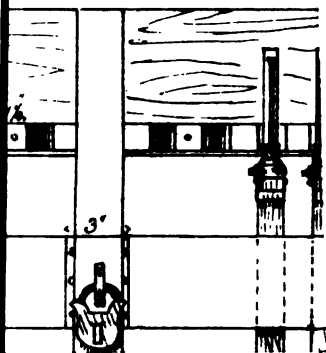


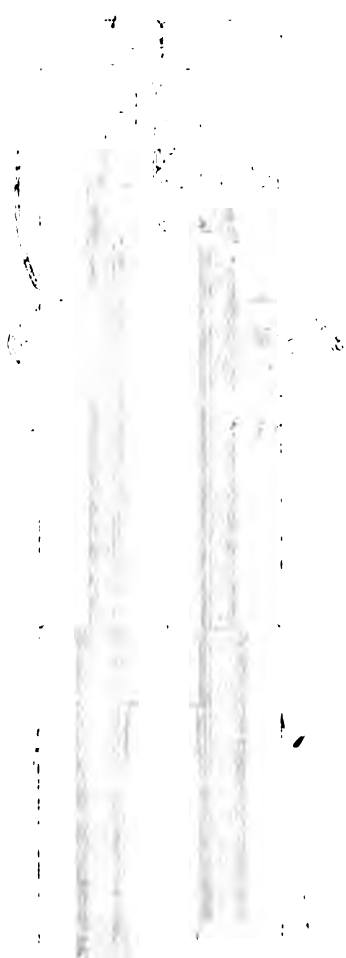


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Fig. 1.

5.2'





**SAFETY ARM RACK, FOR USE IN BARRACK ROOMS,
GUARD ROOMS, &c.,**

By Captain DU MOULIN, Royal Sussex Regiment.

In districts where thefts of rifles frequently occur, it is absolutely necessary that all the rifles in a regiment or battalion should be safely secured at night, especially in guard rooms, and not only must they be safely secured, but they must be easy of access and convenient to the owner's hand. In addition to this, their position must be such that no damage can be sustained, either in consequence of the means adopted for securing the rifles or whilst they remain in this secure position. The causes of damage usually are chains, iron rods, and similar contrivances, which are frequently passed through the trigger guard, and which inevitably bring about the necessity for repairs to the rifle.

The most ordinary contrivance for securing arms in a barrack room is a rack in which the rifles rest each side having, on a level with the trigger guard, a hole through which passes an iron rod. This rod being passed inside all the trigger guards is secured by a padlock fastened through an eye at each end of the rod. Sometimes two rods are used and joined by a padlock in the middle of the rack, but this plan does not remove the great objection to the use of this style, which lies in the fact that the rifles cannot be quickly and easily removed by their owners, but that they have to be removed carefully one by one. Thus, the owner of rifle furthest away from the padlock has either to pull the rod away from all the rifles, or else take off every rifle until he comes to his own. Apart from this, there is another and more serious objection to the use of any rod which it may be necessary to pass through the trigger guard, and this is that the continued insertion and withdrawal of the rod causes, in time, a weakening of the trigger spring and a consequent lightening of the pull-off. This is more often the case where two rods are connected and secured by a padlock, as it is obvious that the weight of the padlock, often considerable, is borne by the triggers of the adjacent rifles to the detriment of the pull-off.

Any contrivance necessitating the use of a chain passed through the trigger guards and secured in the usual way by a padlock, is open to the same objection, increased by the fact that an equal share of the total weight of the chain and padlock is borne by each rifle, not one escaping from the constant pressure on the trigger. Of the two, the rod system appears to be the better, but no company officer having any regard for the rifles under his charge should allow any of these contrivances to be used, or indeed any rack in which the triggers of the rifles are likely to bear weight.

With the object, therefore, of avoiding damage to the rifle and of rendering any and every rifle easy of access, whilst all of them are safely secured when not in use, an arm rack has been devised for use in

barracks which has, after some years trial, proved to be in every way satisfactory.

This rack can be constructed either as a fixture against a wall holding only one row of rifles, or as a fixture in a room, and equally accessible from either side; or it can be made in the form of a stand, either moveable or bolted to the floor. The most suitable position for a rack of this kind is in the centre of a room, should it be a large one, or at the side of a small room. For a large barrack room where a half company is accommodated, as in the Ferozepore barracks, a very suitable position for an arm rack can be found in each room in one of the openings between the men's cots. The openings are about five feet wide, and an arm rack can be constructed in one of them which will hold 24 rifles on each side, or 48 in all—amply sufficient for all the men in the room.

Reference to Fig I on the plan will show that the arm rack consists of a frame of two inch timber, 5' 2" long by 4' 7" in height, divided into two parts by the insertion of a strengthening piece of timber in the middle. Hinged at the top, and supported by two slightly-curved lengths of 3-16ths of an inch bar iron, is a transverse bar of wood, equal in length to the frame, and 5" by 2" in section, which forms the locking apparatus. As may be seen from the sketch, this bar can be raised above the frame and lowered at will, a hasp in the centre enabling it to be padlocked when closed.

A section of this rack is shown in Fig. II, where two rows of rifles, barrel to barrel, may be noticed. In order that the rifles may stand perfectly upright, a length of timber is mortised into the frame at each side, and joined with screws or bolts to the top. This piece of timber is in section 6" by 2", and carries on each side a strip of hard wood, such as teak, cut with notches to receive the barrels of the rifles. The strip of wood is adjusted so that the projection for fixing the sword bayonet on a long-butt rifle is immediately beneath it. With a short-butt rifle this projection is, of course, half an inch below the strip of teak. The object of this adjustment is to prevent the rifles being raised, but as they are not all the same length, it will be found that the short-butt rifles can be raised vertically half an inch, whilst those with long-butts are practically immovable. Again, the muzzles of long-butt rifles will be found to be about an inch below the top of the frame (see Fig. I), those with short butts being slightly over one and a half inches below it. Thus it stands to reason that the rifles cannot be withdrawn by being raised vertically, owing to the projection catching the strip of teak, and it will be shown further on that they cannot be withdrawn at all when the transverse bar shown in Figure I, and in section in Figure II, is lowered and padlocked. The bottom of the frame is, as is shown in Figure II, two feet in width, and is fitted with stout fillets of wood as shown, their object being to prevent the butts of the rifles being moved either to front or to rear. This may also be seen by reference to Figure III, which shows in plan the bottom of the frame, and the position of the butts of the rifles.

The locking bar, which can be raised or lowered (Figures I and II), presses closely with its inner side against the slings of the rifles (Figure I), and thus, when padlocked, holds every rifle firmly into its notch at the top of the frame, and practically immovable. When unlocked and raised to the top of the frame, where it rests until lowered again, every rifle is exposed, and all or any of them can be removed. This removal is effected by drawing forward the rifle until the barrel is clear of the fillet and the top of the frame, when it can be lifted clear of the fillet at the toe of the butt. Thus any man's rifle can be removed without interfering with the others in the rack, and, in case of emergency, every rifle is available at the same instant and without delay.

To insert rifles in the rack, the butt is first placed between the fillets at the bottom, and the barrel allowed to fall into its notch. Sockets for the butts of the rifles, could, if required, be fitted to the bottom of the frame, but this would only add to the expense.

The frame shown in Figure I could be easily fixed against a wall, but the top of it, would, if a long rack was constructed holding more than twelve rifles, require to be supported by a centre piece as shown in Figure I. This is necessary, as wood warps in the hot weather, and an upright every 2' 4" is indispensable. Thus a unit arm rack is actually 2' 8" in length by 4' 7" in height, and holds 12 rifles in front, and, if required, 12 more in rear. If a longer rack is required, other sections, 2' 8" in length by 4' 7" in height may be added.

SAFETY ARM RACK, FOR USE IN CAMP, ON THE MARCH &c.

The majority of the rifles which are constantly being stolen from regiments by Pathans from across the border, and of which no trace is ever afterwards found, are procured from corps in camp or on the march, and it has, hitherto, been a matter of some difficulty to ensure the safe custody of the men's rifles whilst their owners sleep. Necessary, it undoubtedly is, that all the rifles should be so secured, as to defeat any attempt by a thief to suddenly snatch one or more and make off. Rifle stealing has attained such a pitch now, that it would seem every corps on the march in the Punjab is followed by numbers of Pathans waiting only for an opportunity to effect their nefarious purpose.

With E. P. tents an arrangement of iron rods looped round the two poles and connected by a padlock in the centre is frequently used, the rods being passed through the trigger guards of the rifles, but this plan is open to several objections, the principal being that of damage to the rifles. Attention has been drawn to this in the preceding article describing a barrack room arm rack, and it is sufficient here to add that this damage, caused by the constant pressure of the rods or chains and padlocks on the triggers of the rifles is very much increased on the march.

The rods generally used, unless carefully selected of the best Swedish iron, which will bend but not easily break, will be found capable of being broken with little or no exertion, and the rifles removed.

Except in standing camps, E. P. tents are not, however, likely to be met with as frequently as the new General Service tents with three poles, accommodation sixteen men. In these tents there is little room to spare in which to rack the rifles, and it is doubtful whether iron rods or chains passed from pole to pole through the trigger guards would be of much use, as one end would invariably be close to the opening of the tent. In addition to this advantage, there is no bar issued with these tents, as there is with E. P. tents, against which the barrels rest.

The following description of an arm rack for use in General Service tents, which was tried by my regiment both on the march and at the recent Camp of Exercise at Mian Mir, may perhaps prove of interest. Although it has not yet been tried in E. P. tents, there is no reason why it should not prove as useful as it has been in General Service tents.

This arm rack consists of two parts—the locking arrangement, which is rivetted to the lower half of the pole about four feet from the ground, and the stand, which is fitted with sockets for the butts of the rifles and a hole for the centre pole of the tent.

The locking arrangement is a fixture on the pole of the tent, and is not too large to be carried in the pole bag with the rest of the tent poles and ridge poles. The circular stand, however, must be carried separately or else rolled up with the tent, but no difficulty has been found about this.

It will be noticed that the rack has been constructed to hold twelve rifles only, but this is a mere matter of detail, as it can be made to carry as many more or less as may be required. Although a General Service tent is adapted to hold sixteen men, it is doubtful whether this number would ever be actually sleeping in it, if men on guard and others not carrying rifles, such as bandsmen, drummers, &c., are excepted. Should, however, racks for sixteen rifles be necessary, it is easy enough to make them to take this number, although the size of the rack would be increased, and the room in the tent, not over much at the best of times, somewhat diminished.

The locking arrangement consists of two parts, first, a circular piece of hard wood, such as teak or shesham, fitted with recesses on its outer circumference to receive the barrels of the rifles, and a hasp working on a hinge on the top, secondly, a locking ring of iron somewhat larger than the circumference of the wood and fitting loosely outside it, which contains a slot on one side and a staple on the other (and opposite) side, over which the hasp just mentioned is padlocked. On the under side of this circular block are four lengths of rod iron, bent at right angles in order that their lower ends may be rivetted to the pole, their upper ends are screwed to the block and project about half an inch beyond the circumference, in order to form a rest for the locking ring, which revolves upon them. The upper face of this block is covered with sheet iron to strengthen and protect it from rough usage. Each recess for the barrel of the rifles may, if required, be fitted with a falling catch on the outside,

working between the edge of the block and the iron locking ring. The recess is made only just large enough to take the barrel of the rifle just above the upper band, and is of such a depth, that the falling catch passes clear of the cleaning rod.

This block is rivetted to the pole at such a height from the ground, that the projection on the barrel of a long-butt rifle which is used for fixing the sword bayonet, is immediately below it. When short-butt rifles are in the rack this projection is, of course, half an inch below the block, and the rifle therefore can be raised only this distance of half an inch. Thus, no rifle can be raised more than about half an inch, owing to the sword bayonet catch engaging against the lower side of the block.

The rifles are secured against removal in an outward direction by the locking ring, which encircles all the rifles and is padlocked by means of the staple and hasp. To remove the rifles, the hasp is opened and the locking ring turned slightly to the left, which releases it from the stud on the opposite side, and enables it to be lifted up, whereupon any or all of the rifles can be taken out.

To lock up the rifles, the butts having been placed in the sockets and the barrels allowed to fall into the recesses in the block, the locking ring is put in position and turned a little to the left, until the stud engages in the slot, and the staple is opposite to the hasp, which is then lowered and locked.

When the tent is struck, the padlock should be allowed to remain locked through the staple. This will ensure neither the locking ring nor the padlock being left behind in the hurry of striking camp.



THE CAPTURE OF NOISSEVILLE.

Translated from an article signed "An Infantry Colonel" in the "Revue des Sciences Militaires" of September 1891, by Lieutenant R. A.

BROWN, 2nd Border Regiment, Interpreter in French.

Two years ago the German Head-Quarters Staff, with a view to completing the tactical lessons more especially relating to defensive actions to be drawn from the '70-'71 war, published an account of the fighting on the 31st August 1870 at Lervigny and Noisseville.

This episode was chosen to illustrate the importance of results due to the initiative and determination of junior officers, who had often to depend solely on themselves. This object has been fully attained, there being moreover few points of tactical defence to note which are not to be found in our various books of regulations.

We may, however, find some interest in studying the dispositions for the attack on positions, the preconceived defensive arrangements of which were of some strength; and in considering whether the instances of success in these attacks were due to particular formations, to which, finally, under the latest conditions of war, we must see if we could again resort.

Nearly twenty years have passed; a new armament has been adopted; and we find ourselves in the pangs of doubt, and even fear, to which the adoption of a material change, or the introduction of a new weapon, before the experience of war has defined the value of the innovation, has always given rise.

We can remember what was said of the "Metrailleuse" in 1870, yet, though undoubtedly of great service, it never had any effect on the enemy's tactical formations, nor did it inflict on him the enormous loss which was expected.

The small-bore magazine rifle and smokeless powder must, it is true, be recognised as improvements of a much higher degree of importance: but will they cause such changes in our infantry tactics as certain writers fear? Shall we, to avoid the enemy's fire, be forced to adopt so scattered and premature an extension, as to enter the effective fire zones in long, wavering lines, without density, without cohesion, and without control?

In the German army this question is debated as eagerly as in our own, and has already been negatively answered by a highly qualified authority. In the opinion of General Bronsart de Schellendorf, one should "act first, get cover afterwards." This is the old "Forward" watchword of the victorious, the watchword of Suwaroff, the watchword of the French armies at the beginning of this century. The German ex-minister of war* remarks "If you introduce as a "primary obligation in tactics the necessity of avoiding loss, you had "much

* General Bronsart de Schellendorf, above quoted.

better stay at home," and whilst keeping in view the changed conditions of the battle-field, the General objects, so far as regards the formation of supports and above all reserves, to a succession of weak lines. He would wish the troops to be kept as long as possible in close formation, even in the fire-swept zones, and regards consequent loss in the opening movements as nothing compared to the advantage of being able to control the movements of the men and keep them in hand.

The General is no advocate of long range fire by infantry, and considers that except on the defensive, it should be left to the artillery. He assigns 660 yards at the limit of effective rifle fire, the losses caused by which, though more severe than of old, may be largely avoided by a resolute and continuous advance. He emphasizes the axiom, that the attack is to be prepared by an effective artillery fire, and that cover is to be judiciously utilized; "if a premature attack be made over open ground," "the result will be a funeral on the largest scale."

Finally, he lays down that close formations, as being more handy and capable of profiting by cover, are to be preferred to all others up to the moment of going into action.

From this last point of view, the fight at Noisseville has already attracted attention. General Thoumas, in an article (*Le Temps* 3rd October 1889) which appeared soon after the publication of the German staff sketch, has brought to notice, as clearly as might have been expected from so competent an authority, the peculiar features of the engagement. In it we find a striking example of the judicious use of small columns. Their handiness, cohesion, and the power they gave their commander of first concealing and then hurling them on to the enemy's weak points, contributed largely to the success obtained.

Though new arms have been introduced, these advantages have not vanished, but will still be of use to commanders who know how to seize their opportunities; for in war everything depends on circumstances, and the adoption of an unvarying formation, whether for preliminary movements or for attack, can only give false ideas and possibly lead to serious disaster.

I.

The north-east section of the lines of investment which enclosed Metz at the end of August 1870 consisted of a defensive line starting from the right bank of the Moselle at Malroy and passing through Charly, Faily, Lervigny, Noisseville, and Montoy. The extent of the section was about $6\frac{1}{2}$ miles.

This line stretched over a plateau gently sloping towards the Moselle and crossed by the roads leading to Thionville and Lasserre. The highest part of the plateau is near the village of St. Barbe, about $7\frac{1}{2}$ miles to the north-east of Metz.

Several fairly deep valleys cut up the table-land at intervals into long hog's-back spurs, the longest of which, lying north-west by south-east, springs from St. Barbe, and bears on its eastern extremity the fort and village of St. Julien. This spur is bounded on the north by the ravine of Faily, on the south by the valley of Vallieres; it is a mile and

a half wide, has no natural obstacles, and an advance along it can be barred by the villages of Faily, Poixe, and Servigny.

To the south of the Servigny spur and perpendicular to its direction lies the valley of Lauvallier. Along it flows a stream of the same name, which further on joins the Vallieres rivulet.

On the left bank of the stream is the small plateau of Borny; on the right, the Noisseville spur. This last is parallel to the Servigny spur, is 1600 yards across, and is bounded on the south and east by a slight fall in the ground, which can be traced back to Retonfey, about two miles north-east of Noisseville. A streamlet flows along this dip of the ground towards Montoy.

The Metz-Sarrelouis road, as it runs towards the latter town, crosses at Lauvallier the Lauvallier valley, 1300 yards from which it begins to rise on to the Noisseville spur; passes through the hamlet of La Brasserie, leaving Noisseville on the left; and then follows the crest line of the country towards the north-east. The hamlet of La Brasserie, on a commanding point, enfilades the road and the natural glacis on either side of it, as soon as the former leaves the valley.

The country forming the glacis above mentioned is perfectly open and most favourable to rifle fire, and is also in large measure commanded by Noisseville on the northern slope. Hamlet and village together should effectually bar any passage along the spur.

The section we have just described was held by the 1st Prussian Army Corps (General de Manteuffel), together with the 3rd Landwehr Division.

The Landwehr held the line from the Moselle to the Faily valley, and to their left the 1st Infantry Division occupied Faily, Poixe, Servigny, and Noisseville, which had all been placed in a state of defence. Each of the first three villages was held by a battalion relieved daily; in Noisseville a battalion was permanently quartered.

The remainder of the 1st Brigade (General de Gayl) formed the out-post reserve (2 battalions) in rear of Poixe. The 3rd Brigade, 1st Division, was near St. Barbe.

The 2nd Division (3rd and 4th Infantry Brigades) covered the field magazines at Courcelles-sur-Nied and Remilly, while the divisional cavalry closed the gap between the 1st and 2nd Divisions.

Such were the German dispositions when on the 31st of August the French Army, with the object of forcing a passage between the Sarrelouis road and the Moselle to gain its objective Thionville, formed up in a semicircle facing the enemys lines; the right wing (3rd Corps) astride the road; the left (6th Corps), flanked by the Moselle, in advance of the St. Julien fort; the 4th Corps in the centre; the 2nd in reserve behind the 3rd; the Imperial Guard on the glacis of St. Julien, in rear of the 6th Corps. The main attack of the French was to be on the German left, at Faily, Servigney, and Noisseville.

At earliest dawn the German out-posts report extensive movements on our part. The garrisons of the villages immediately occupy their lines of defence. The 3rd Infantry Brigade (General de Memery), composed of the 4th and 44th Infantry Regiments, 5 squadrons, and

2 batteries, is called up from Courcelles-sur-Nied to Retonfey to support Noisseville, the temporary occupation of which by the French on the 26th August had clearly shown its importance. In fact, Noisseville once captured, an assailant could debouch by Chateau, Gras, on St. Barbe, thus turning the flank of a great part of the line of resistance. The village had accordingly been placed in as strong a state of defence as possible.

Noisseville consisted of two broad streets crossing nearly at right angles, and lined with houses built in stone. At the west entrance was a country house surrounded by a large walled garden. At the La Brasserie end of the street running north and south the church, with its surrounding cemetery, was a strong point of defence. Barricades had been erected at the points of entrance of the two roads, and all the outer walls had been loopholed. A shelter trench covered all the west and a part of the south front, on which latter side an abatis was added.

The entrance of the La Brasserie road was blocked by a tambour placed in front of the church. At certain points the loopholed walls behind the shelter trench allowed two tiers of fire to be used.

The hamlet of La Brasserie, a quarter of a mile to the south of and slightly higher than Noisseville, was also defensively occupied. The roads leading into it were barricaded, the walls loopholed and provided with banquettes. The large farm of L'Amitié, in the north-east angle of the Sarrelouis road and the Noisseville path, was also barricaded and loopholed.

The defence of Noisseville had been entrusted to five companies of the 1st Regiment Crown Prince Grenadiers (Lieut.-Colonel Wienskowski). Two of these, on the west and south, manned the first line of defence (about 550 yards in length), with the third formed in half companies in support.

The fourth, after sending a section to La Brasserie, was placed as reserve in the N. E. salient of the village. The fifth company, in the valley of Valtieres, a little to the right rear, was to keep up connection towards Servigny.

The total strength of these five companies was about 1,000 men, and they were supported, from a mile and a half in rear, by de Nemerty's brigade, which arrived at Retonfey about 1 o'clock. A little later, detachments from the 4th Brigade occupied Montoy and Flauville, on the extreme left.

On the French side Montaudan's division concentrated about 2 p.m. on the west rear of the Lauvallier ravine, having General Clinchant's Brigade (81st and 95th) on the north of the Sarrelouis road.

The 95th, commanded by Colonel Davout, Duke of Auerstädt, had sent two companies of its first battalion in skirmishing order up the far slopes of the ravine to watch the enemy, and a third company into Lauvallier which was to be held as a "point d'appui."

A section, commanded by 2nd Lieut. Onzilleau had reconnoitred Noisseville and La Brasserie, and in this minor operation, skilfully and coolly managed, the officer commanding the section himself with two men been able to get within 220 yards of the village.

From thence he assured himself that the hamlet had been placed in a state of defence, and noted both the hasty defences erected and their occupation by the enemy.

About half past three Montaudon's division was ordered to carry the villages held by the enemy's left wing. The 2nd Brigade was to attack Montoy and Flauville, while the 1st (General Clinchant), which we shall follow, was to seize Noisseville, debouch from it, and push on as far as Château Gras.

The Colonel of the 95th, whose regiment had been temporarily quartered in Noisseville five days before, had reconnoitred the country round, and noted the best way of capturing the village without too great a loss. To effect this object it was first necessary to carry La Brasserie, so as to act on the flank of the defenders and threaten their retreat. He therefore determines :—

- (1) With his 1st Battalion, to draw the enemy's attention by a demonstration against the west front of Noisseville.
- (2) With his 2nd Battalion, to rush La Brasserie by an enveloping attack, to be carried out with the utmost rapidity.
- (3) To keep his 3rd Battalion in reserve in the valley of Lauvallier.

General Clinchant sanctions this plan, Colonel Davout assembles his officers, tells them what the regiment is to do, and explains shortly the objects to be attained, the formations to be employed, and the part which each officer is to take, as follows :—

"The dash on La Brasserie is to be carried out with the utmost energy. The 2nd Battalion will start from the bifurcation of the ravines of Lauvallier and Montoy, so as to approach the enemy on the left and to profit by the low ground, which will for some time defile the movement from view."

"The six companies will form three echelons of two companies each, formed in half company columns. The companies being about 100 strong, each echelon will be formed of a small column (at six paces) of four half companies, each numbering 25 files. This formation in three columns will tend to keep the men in hand, and distract the enemy's attention from any one particular point."

"There will be a lateral interval of 100 paces between echelons, which will then "advance in echelon of 150 paces, by the right." The echelon of direction will take as its distant point a small copse a little to the left rear of La Brasserie."

"The leading half company of each echelon will be deployed as skirmishers, and the skirmishing line thus formed will be under a Captain, who will keep it a distance of 200 to 300 yards in front of the battalion, whose advance he will have to cover. The skirmishers will draw the enemy's fire, and they alone are to answer it. The advance will be very rapid, so as not to give the hostile reserves time to come up. The distance to be covered being 1550 to 1650 yards, of which from 770 to 880 yards will be under fire, the advance must be continuous up to about 350 yards from the objective. From thence the pace will be still further accelerated and the attack will culminate in a resolute bayonet charge. The echelons are strictly forbidden to fire a shot."

(On hearing this last order General Changarnier, one of the listeners, cannot refrain from expressing a doubt as to its execution. "Oh, you cannot expect impossibilities" he exclaims. "General" answers the Colonel, "I am certain that not a man of the echelons will fire." As a matter of fact, they did not fire a single shot.

"The 1st Battalion, to demonstrate against the west front, will have three companies out as skirmishers and two in column under the battalion commander in reserve. The sixth company will occupy a large farm on the east slope of the Lauvallier ravine, and put it in a state of defence to serve as a "point d'appui" in case of retreat. The skirmishers will not advance nearer than 600 yards to Noisseville, the reserve companies will be sheltered by a slight fold in the ground. The feint will become an attack, but only under orders from General Clinchant, after La Brasserie has been carried."

"The 3rd Battalion will remain until further orders in the Lauvallier ravine."

These instructions given, the field of action settled, and each commander's duty explained and understood, the preparatory movements commence. General Clinchant, to deceive the enemy, inclines the 95th to the left (towards the north), then brings it down into the ravine by command "change direction to the right," and as soon as the regiment is hidden from view, moves it southwards. The 1st and 3rd Battalions remain in the positions assigned to them, while the Colonel leads the 2nd Battalion across the Sarrelouis road to the junction of the Lauvallier and Montoy Valleys, and there forms it up in line of columns as previously arranged.

Meanwhile the other corps of the division also carry out their opening movements, and the enemy watching them, prepares to meet the attack.

Two German batteries, from a position in advance of Retonfey, commence firing. A French 4-pounder battery advances to the front of Lauvallier, and tries to answer them, but with so little success that it is presently forced to move to a second position near La Planchette, from whence it enfilades some Prussian infantry seen between Retonfey and Noisseville. Simultaneously, a 12-pounder battery (French), of the 3rd Corps reserve, opens on Noisseville and succeeds in setting it on fire. At last a single cannon-shot from Fort St. Julien gives the signal for the attack to commence. Colonel Davout moves off his 2nd Battalion* to the commands, "Echelon at 150 paces." "Forward, by the right, form echelon." The movement is carried out as if on parade, the rear echelons accurately measure their distances. The colonel, sword in hand, guides the leading echelon.

The French 12-pounder battery near La Planchette now turns its attention to La Brasserie, but almost at once ceases firing at the express request of the colonel, so that the fire of the guns may not impede the advance of the infantry.

However, it is not long before the movements of the battalion are noted from La Brasserie. The post is reinforced; first, by a section

* Commandant de Linage.

which comes in at the double from Noisseville; secondly, by an entire company sent by the 4th Grenadier Regiment, of De Memerty's brigade. At the same moment the German batteries in action in advance of Retonfey turn their fire on the attackers.

The slight depth of each of the three columns, the wide intervals between them, and their continuous advance, greatly diminish the effect of the artillery fire; while the advanced skirmishing line draws the whole of the rifle fire.

Gaps are knocked into the ranks of our small columns; the officers give the word to close up; order is maintained and the advance becomes faster and faster. At 400 yards from the position the skirmishing line is received by a fire so murderous and rapid that it halts and opens fire in return. The echelons come up to the skirmishing line: notwithstanding their losses, they are still compact and well in hand. The skirmishers cease firing, on the right they form groups in the intervals between the columns, on the left they resume their advance, and suddenly, in a brilliant rush, the whole body dashes forward with the bayonet. The defences south of the road are carried, and the copse occupied.

The presence of the French on their left flank, and the enfilade fire to which this exposes them, forces the Germans to retire in disorder on Noisseville. To cover the retreat, a captain of the 4th regiment, though wounded, attempts further resistance in the large farm of L'Amitié. After a short bayonet fight he and 52 of his men are made prisoners. La Brasserie is clear of the enemy. The battalion commandant immediately occupies the north-east outskirts of the hamlet, and orders the Sarrelouis road to be watched.

The 3rd German brigade, formerly in position near Retonfey, from whence its artillery has vainly essayed to stop the onward march of the victorious battalion, is now to be seen advancing in three lines along the south of the Sarrelouis road. This brigade had been able to throw a company into La Brasserie previous to the attack, but as it arrives itself too late to prevent the loss of the position, its commander sends one battalion to continue the fight near the hamlet, despatches another to Noisseville, and keeps his main body in reserve, a short distance away.

The 2nd battalion of the 95th, which had suffered considerably during its attack, now finds itself in a somewhat critical position. Accordingly, Colonel Davout, after speedily informing General Clichant of his success, so that the latter may order the demonstration on the west front of Noisseville to be converted into an attack, rapidly brings up his reserve battalion (the 3rd*), in line, posting half of it on the right of La Brasserie, and half in the houses.

This reinforcement and the intervention of the 1st battalion† which is now developing its attack, relieves the troops in La Brasserie to such an extent that, whilst still checking the enemy on the east, they are able to pour a heavy fire on Noisseville, a great part of which is exposed to them in enfilade and reverse. This fire contributes greatly to the ultimate success of the 1st battalion.

* Commandant Sorel. † Commandant de Plauchot.

The attack of that battalion, though aided by a "mitrailleuse" battery, is twice repulsed by the intensity of the enemy's fire. After a time, however, ground is gained: the left company, which has suffered less than the rest, makes a determined bayonet charge on the northern end of the shelter-trench. The Germans hurriedly abandon their posts, and retire to the interior of the village, intermingled with the French, who break in towards the south. The cemetery, a miniature fortress held by 300 men, is attacked in front by the right flank companies, and the enemy, taken in reverse by the fire from La Brasserie, is forced to abandon it. Soon the whole village is evacuated. Two companies are at once pushed on to the eastern outskirts; one company occupies the cemetery; another the barricade; the two remaining companies are kept in reserve inside the village. The two La Brasserie battalions still keep the opposing battalions of La Memerty's brigade in check.

The German batteries, in action in rear of Servigny, now open a hot fire on La Brasserie and Noisseville to prevent our debouching therefrom. Colonel Davout details a company of the 3rd battalion under Captain Barthez to open fire on them and force them to retire. The Captain selects his best shots, and in 20 minutes compels the batteries to move.

It is now half-past-six in the evening, too late to push on to Chateau Gras; an intermittent fire only is still kept up, but when night falls two battalions of the 95th have advanced as far as 800 yards beyond the villages.

On the German side, the 1st battalion Crown Prince Regiment has retired into the valley of Valliers, not far from Noisseville, where three companies of the 3rd regiment join it. The two battalions of the 4th regiment (de Memerty's brigade), lately in action against the 95th, have given up the idea of re-taking Noisseville. The 44th regiment has had no better success against Montoy, and the main body of the brigade is concentrated about 2000 yards S. E. of La Brasserie, on the right of the Sarrelouis road.

Towards nine o'clock, the 81st, till now in reserve, is sent up by General Clinchant and supports the 95th, with one battalion on the right of Noisseville and the two others at La Brasserie. The 95th is still gaining ground. Colonel Davout, hearing rifle fire (from Servigny), wishes to inform himself as to the enemy's movements. Having no cavalry, he takes a half company forward in advance of his battalions and parallel to the road. Drums and fifes are heard at some distance. By placing the ear on the ground, the measured tread of a strong force advancing along the road can be distinguished.

The Colonel at once orders the half company to lie down on the left of the direction which the enemy is taking, with directions not to fire till the head of the column has passed. He sends back word to the 2nd and 3rd battalions to deploy each two companies to repel the impending attack.

This proves to be a strong counter attack of the 3rd brigade, which advances with drums beating in two lines, regiments in rear of one another, with the left on the road.

After firing one volley point blank, the half company in ambush charges the left flank of the Germans with the bayonet, and throws them into the utmost disorder.

In the German centre, one battalion succeeds in getting fairly close to Noisseville, but the right is under cross fires. General de Memerty orders the "retire" to be sounded, and Noisseville is finally left in the hands of the French.

The German account mentions a further attempt at re-capture about 10-30 P. M., but none of our reports notice it.

II.

During the fighting on the 31st August, the three villages attacked by the French army fared very differently. Faily remained all day in the power of its defenders. Servigny was captured by surprise and then re-captured by the Germans. Noisseville alone was taken and kept till the next morning.

The 95th regiment, which was unaided, had not more than 1700 combatants of all ranks, and lost during the day, eight officers killed, five wounded; 37 rank and file killed, 187 wounded.

The enemy's force, not reckoning the night counter attack of the 3rd brigade with five battalions, was as follows:—

One battalion of the 1st Crown Prince Regiment and two battalions of the 4th regiment. As these battalions were of full strength the enemy cannot have had less than 2500 men, whose losses were:—two officers killed, eight wounded, one missing; 46 rank and file killed, 218 wounded, 43 missing. The proportion of losses to total strength was about the same, i. e. $\frac{1}{3}$, on either side, but the French fought in the ratio of two to three. The German staff sketch, reviewing the action, in no wise seeks to minimize the check suffered at Noisseville. On the contrary, the importance of its possible consequences is thus especially pointed out.

"The possession of Noisseville was absolutely necessary if the Germans were to hold the defensive line they had taken up. The General Commanding the 1st army corps took his stand on the advanced position Faily-Noisseville, and engaged the whole of his forces on this line alone, without selecting a second defensive position. He never even thought of retreat. Had the enemy's attack succeeded, the whole of his guns would have been captured and his army dispersed. As he has said himself "he was staking all to win all".

The Germans attribute the loss of Noisseville to two causes; firstly, to the inadequacy of the defensive works—so important a "point d'appui" should, they say, have been turned into "a fortress capable of defence to the last extremity;" secondly, so extensive a front should have been divided into sections, with a commander assigned to each. The neglect of this precaution is said to have led to delay in the delivery of reports and transmission of orders, and to doubt as to who was actually in command of the various units.

The fact is, that the Noisseville garrison was not supported by troops of its own brigade (the 1st) nor even by troops of its own divi-

sion. For it was the 3rd brigade of the 2nd division, called up during the morning from Courcelles-sur-Nied, over ground new to its commander which came to support Noisseville, but too late to prevent the loss of La Brasserie. This brigade never threw its whole strength into the action, and it waited till 9 o'clock at night before attempting a counter attack which, with drums sounding, was hardly likely to find itself unexpected.

It is open to us to surmise, that if the Noisseville battalion had belonged to the brigade ordered to support it, that brigade would have arrived in time and would have acted with more energy. Here we have an instance, which should not be forgotten, of the value of the axiom that "outposts should be furnished by the body of troops which they are to cover."

However, these criticisms only concern, after all, details of minor importance, and which are often inevitable in a campaign. These details did not largely contribute towards lightening the task assigned to the 95th, and we must look elsewhere for the causes of that regiment's success.

The 95th was a splendidly trained regiment, was most capably commanded, and had several times already been led into action by Colonel Davout. A spirit of mutual confidence animated all ranks. Particular attention was paid to the food supply, and the men never found themselves obliged to march or go into action without food. The regiment was thus in the best state, both physically and morally, to ensure success, provided the preliminary movements were well calculated, and the attack skilfully arranged and vigorously carried out. All the above conditions were most amply fulfilled, as the following re-capitulation of the events of the day, up to and including the fall of La Brasserie, will show.

The General details, to attack Noisseville, a regiment which has occupied that village and knows the country round it. A reconnoitring party is able to advance to within 220 yards and bring back accurate information. The point of attack is skilfully chosen. Every officer knows the object to be gained, and the reasons for the formations used, and each accordingly, in his own sphere, feels himself responsible for success. Each man's energy and efforts converge with tenfold strength on the goal to be attained. The tactical formations are suitable to the ground and to the circumstances of the fight, and are taken up as on parade, to the regulation words of command. All cause for confusion is thus avoided, and the coolness of the officers gives confidence to their men.

The 1st battalion, entrusted with a demonstration which is to become a decisive attack at a given moment, deploys three companies in skirmishing line, keeps two in column, and places the sixth in reserve near Lauvallier.

The 3rd or reserve battalion, when it is subsequently brought up with the utmost rapidity to reinforce the 2nd battalion at La Brasserie, has no time to make a *détour* to conceal the movement. However, it has no longer to fear any frontal fire from La Brasserie, but its left flank

is much exposed to fire from Noisseville. The battalion accordingly moves from Lauvallier to La Brasserie in line, taking the Sarrelouis road as the axis of its march.

The 2nd battalion is to carry out an enveloping attack on the enemy's extreme left, which to ensure success must be very sudden and vigorous. The small columns used are extremely handy, and keep the men under control better than any other formation. To keep them out of sight of the enemy as long as possible, advantage is taken of the covered way formed by the valleys of Lauvallier and Montoy. When the columns emerge from the valley, they have only to march straight to their front, but the distance is 780 yards and under fire. They are separated by intervals of 100 paces and covered by a line of skirmishers, which alone is to answer the enemy's bullets and is only to commence firing at about 400 yards from the village. Exposed to the fire of two batteries, the columns begin to suffer severely; if they halt they are lost; but led on by their officers they never hesitate a moment, they quicken their pace, break into a charge, and rush the position with less loss than the 1st battalion experiences later in attacking the west front of Noisseville.

Would the same result have been attained by an advance in successive lines, in which formation the men are less under control, order is more difficult to maintain, the advance is slower, and the moral effect on the enemy smaller? We doubt it extremely. In meeting an attack such as that of the 2nd battalion 95th, the defenders do not feel their spirits raised as they would be by the inevitable wavering of thin lines, which halt to fire and which afford them an extended target. On the contrary, they become more and more uneasy as they see advancing on them with increasing speed a determined enemy, who affords them only a very small object to fire at, and yet whose formation tends to exaggerate his numbers. The defenders fire first on the skirmishing line, because it is nearest to them; when the columns come up, the skirmishers run into the intervals, but the defenders continue firing straight to their front along the whole line. The bullets falling into the intervals are wasted, or nearly so, and each column, unless it gets into a re-entering angle, is after all only exposed to fire issuing from a front equal to its own.

The German official narrative shows us clearly that the strength of the attack was over estimated. "All of a sudden, dense masses of skirmishers dash out of the valley between Montoy and La Brasserie, on the left of the position, and with a swift rush attack the buildings south of the road. The 3rd section retreats; the 8th section and the 2nd company of the 4th regiment are obliged to follow its example."

The "dense masses" are merely three small columns of 150 men, preceded by a skirmishing screen of the same strength. The defenders pour in a continuous and rapid fire, yet the dashing advance of their enemy forces them to retreat. Would they have been as easily dislodged by an advance in line? Most assuredly not.

Twenty years ago both French and Germans were armed with breech-loading rifles, but the latter possessed decidedly superior guns.

This advantage no longer exists. Both armies also have improved their rifles. Increased initial velocity, ranging power, and penetration of the bullet are common to both, and so flat a trajectory has been obtained, that no elevation is required up to at least 440 yards. But notwithstanding the long range capabilities of modern rifles, the difficulty of regulating infantry fire will almost always cause it to be of uncertain effect at extreme distances, at which artillery only will be really destructive. It is by taking advantage of every scrap of cover, of every semblance of a screen they may fall in with as they move forwards, by the rapidity of their advance, by the use of formations of small depth with restricted frontages and separated by wide intervals, that the troops of the attack can hope to avoid the missiles of the hostile guns or at any rate to minimize their effects.

When medium distances are reached the improvements introduced in modern fire-arms have full play, and will give deadly tokens of their value by the infliction of losses incomparably more severe than any we have experience of. But we can, on the other hand, rely on the infantry attack being preceded by an infinitely more thorough and effective artillery preparation than was possible in former days, on the support which the assaulting columns, till they reach 550 yards from the position, will receive from their artillery, and on the great losses which the defensive will suffer from that same artillery.

Thus we see that, as compared with past campaigns, the improvement in fire-arms of all descriptions will entail the employment of a largely stronger force to obtain a given result. One weak battalion, for instance, will never again be able to capture a post like La Brasserie, held by two or three companies. Two battalions will be required; the first deployed will cover the movements of the second, as the skirmishers of the 95th covered their main body. The covering line will suffer the most, but it will clear the way for the attack of the second battalion which, in small company columns with wide intervals, will have sufficient strength left to enable it, if boldly led, to charge the enemy with the bayonet and drive him out of the position. In our opinion the altered circumstances of war do not materially affect the value of the attack formation we have been discussing.

The officer commanding on the spot will of course be the best judge as to whether the enemy has been weakened sufficiently to justify him in ordering an assault, or whether local features, such as the distance to be covered under fire, the nature of the flank defences, and so forth, render the employment of some other formation imperative. However that may be, when and wherever a commander can lead his troops to the assault in close formation, which gives the supernumerary ranks the maximum of control over their men, the adoption of that form will "*ipso facto*" prove a pledge of success.

NOTES ON THE ATTACK FORMATIONS OF THE FRENCH ARMY,

By CAPT. C. E. BADDELEY, R. E., Bombay Sappers and Miners.

The following notes, which may prove interesting, of the various attack formations of the French Army, together with their fire regulations, have been taken from the "Règlement sur l'exercice et les manœuvres de l'Infanterie", of which three volumes have been consulted:—the "Ecole de Compagnie," "de Bataillon", and "de Régiment." The date of their publication is 1890, and I am not aware of the existence of any more recent editions.

The Attack as carried out by a French Regiment.

"When a regiment is brigaded with others, it may be formed into two or three lines. In the former case the third line is formed of special troops; but when the regiment is acting alone" (which is the case taken in this instance) "it always provides three lines of attack."

"The 1st Battalion forms the first line (the firing line.)

The 2nd Battalion forms the second line (the assaulting line.)

The 3rd Battalion forms the third line (the reserve line.)"

The duties of each line will now be considered:—

1.—"The first line is the 'attacking line.' It commences and carries out the combat. It makes the frontal attack or defence. This line should not manœuvre, neither should it have to guard its own flanks. Its only rôle is to reach the enemy and assault him, or to resist his attack, and nothing should divert it from this object."

2.—"The second line is closely connected with the first line.

(a.) It should safeguard the flanks of the first line.

(b.) It should strengthen the fighting line, if necessary, or extend it.

(c.) It should carry the attack on to the assault, in case the first line cannot deliver the assault by itself.

(d.) It should carry on with it to the fight any portions of the firing line that may have given way; and in the case of a repulse, it should renew the attack."

2.—"The third line is a manœuvring line, and has a certain independence of action. It is under the direct orders of the officer commanding the troops (regiment, brigade, or division.)"

"This line furnishes the troops required to make a flank attack, and has also to repulse any flank attacks of the enemy.

This line also may have to make counter attacks on a large scale, and has to oppose those made by the enemy.

It follows the advance, and if the attack succeeds, it helps to occupy the position, and assists in the pursuit.

It covers the line of operations, and employs the time at its disposal in constructing in rear, by means of hasty fortifications, a line of

defence, behind which it may, in case of defeat, check the enemy, and perhaps allow the offensive to be taken again."

Formation of the Battalion forming the First Line.

"When the commandant of the battalion has received orders to advance to the attack, and if circumstances do not oblige him to deploy immediately, he should form his battalion into two lines, the second being about 300 yards behind the first."

"In each line there are two companies in column of sections at varying distances apart, but within the limits of the front of attack, and not as a rule exceeding a front of 400 paces."

"This formation allows the battalion to move freely over any kind of ground, without suffering excessive loss from artillery fire."

"The commandant directs his battalion, thus formed, towards the point of attack assigned to him."

"During the approach, the Captains march their companies, in the direction pointed out to them, in the formation best suited to the ground and to concealment from the sight or fire of the enemy. They should be careful, however, not to deploy too soon."

"Patrols are sent out in front to scout, and may have also to drive in the enemy's patrols and scouts."

"When the enemy's fire renders it necessary, the commandant forms the battalion for attack."

"The scouts halt and wait for the battalion, or rejoin it, as the case may be."

"The first line, alluded to above, consists of two companies, each of four sections."

"Two of these sections in each company advance as the 'firing line,' and the other two follow in support."

"The sections in the firing line are deployed, between 1,500 and 1,250 yards, into line of half sections, in close order; between 1,250 yards and 1,000 yards into line of groups; and between 1,000 yards and 800 yards these groups extend into line of skirmishers." (The interval between files in this extended order is apparently three metres, or four paces.) The Captains are not obliged, however, to place invariably two sections in the firing line at the commencement of the action, but it is laid down that they should not hesitate to put as many rifles in the firing line as are necessary to subdue the enemy's fire, as soon as they are seriously engaged.

"The firing line opens fire when necessary, the best shots firing on the enemy's officers, but whenever the nature of the ground permits of it, the advance should be carried on without any firing."

"The attack is generally prepared by the artillery, and sometimes by infantry fire from special troops occupying favourable positions."

Although the regulations lay down elsewhere that volleys should be continued as long as possible, the French evidently do not consider that they could be used with effect within 800 or 900 yards of the position, after the men have extended.

"Volleys cease to be effective, as soon as the men become too excited to listen properly to the words of command."

"The reserve follows carefully the vicissitudes of the fight, gradually drawing nearer to the firing line, without waiting for orders, so as to be ready to replace the supports, as soon as they are absorbed. The reserve is broken up into sections, which advance in echelon."

"The firing line advances from position to position until further advance is impossible; one may assume that it will then be about 400 to 450 yards from the position, and that all the supports have been absorbed."

"At this moment part of the reserve will be about 100 to 150 yards behind the firing line, and the rest about 200 to 250 yards behind, and generally opposite gaps in the firing line."

"Each company in the firing line advances by its centre, consequently there will be gaps between them and on their flanks, due to the men closing in."

"The commandant of the battalion then reinforces the firing line by one or more sections of the reserve (they generally come up in close order), and the advance is resumed with the utmost vigour, generally by echelon of companies."

"At about 220 yards from the enemy bayonets are fixed, and a rapid independent fire is poured in. The last portions of the reserve are brought opposite those portions of the firing line where the greatest effort is to be made."

"The battalion forming the second line has carefully followed, drawing nearer and nearer, so as to be able to replace the reserve of the leading battalion, and to join in the assault at the decisive moment."

"If the rapid independent fire does not drive out the enemy, the last portions of the reserve reinforce the firing line, which immediately rushes forward, halts about 150 yards from the enemy, and pours in a furious magazine fire."

"During this fire, the second line joins the firing line, the bugles and drums sound the 'charge' and the whole force charges the enemy with loud cries of 'en avant, à la baïonnette!'"

"If, however, the commandant of the first line thinks he is strong enough to carry the position without the help of the reserves, he should not hesitate to rush the enemy with the troops at his disposal."

The Attack Formation of a Battalion acting singly.

The dispositions for attack of a battalion acting by itself differ somewhat from those when it is brigaded. The directions given are very general, and considerable latitude is allowed the commandant in deciding on his formation.

"In the case of a battalion acting singly, it has to provide, from its own resources, for all the phases of the combat. The commandant must therefore be careful to keep a reserve in hand, husband his forces, guard his flanks, and provide for a line of retreat."

"The nature of his attack will depend on the object to be gained, the nature of the ground, and on the strength and nature of the enemy's troops."

"Having decided on his objective, the commandant reconnoitres the position of the enemy by means of the company in the advanced guard, and advances in the formation best adapted to screen his companies from the enemy's fire."

"The company in the advanced guard commences the action, feels for the enemy, and obliges him to deploy his troops and discover the position he means to take up."

"The commandant then takes the necessary steps either to extend the firing line, or to make a flank attack, for the purpose of diverting the enemy by a false attack, or of supporting the first troops engaged."

From other portions of the "Ecole de Compagnie" and the "Ecole de Battalion," an ordinary front attack would appear to be carried out as follows, subject to modifications according to the strength of the enemy's position.

A second company extends the firing line of the company in the advanced guard, each company having two sections in the firing line and two in support.

The companies advance each by their centre, and the front occupied by them (400 paces) in extended order is about 300 metres. At about 800 yards, firing is commenced, the firing line having during the approach successively extended from sections to half sections, and then to groups and to skirmishers. The firing is carried on by individuals at each halt.

When it is possible, however, the advance is made without firing.

One company acts as a reserve, and is divided up into sections, which advance in echelon.

The remaining company is held back as a last reserve, under the special orders of the commandant of the battalion.

This company has to meet any flank or counter attacks made by the enemy, and in case of a repulse, its duty is to hold the enemy in check while the other companies rally behind it.

The supports are absorbed into the firing line during the advance up to 400 yards from the position, and the company in reserve then sends up sections or half sections to the front as required, keeping back the last portions until the moment for the assault has arrived. If, however, all the reserve has been used up before this moment arrives, the special reserve must send up sections at the decisive moment to carry the firing line on to the assault.

"If the attack succeeds, the battalion occupies the position, and pursues the enemy, re-forming as quickly as possible, in the manner laid down."

"Any portions of the reserve not engaged are brought up to occupy the position and hold it against counter attacks."

Regulations regarding fire control, and the use of different kinds of fire.

"The commandant of the battalion points out the fire objectives to the Captains, and if possible, that part of the enemy's line on which fire is to be concentrated."

"The company commanders decide what kind of fire is to be used, and regulate the expenditure of ammunition ; they determine the objectives if they have not already been pointed out by the commandant, or if unforeseen occurrences suddenly alter the nature of the fight."

"At the beginning of the action, the section commanders give the elevations, and tell the men what to aim at. This duty devolves on the captain as soon as the whole of his company is in the firing line."

"The section commanders and non-commissioned officers superintend the elevations and the direction of the fire."

"During the fight, aim should be taken at the feet. For all distances under 600 metres, at troops standing up or moving about, fire will be sufficiently correct by using the 400 metres sight."

"Volleys help to maintain the ascendancy of commanders over their men, allow of concentration of fire on the same objective, and of correction of fire by observing the impact of the bullets, and enable the expenditure of ammunition to be regulated."

"Volleys can be executed *deliberately* (coup par coup) or *rapidly* (à répétition.) They should never be carried out by a larger unit than a half company."

"Volley firing is comparatively restricted. It is only effective, when men keep sufficiently cool to listen to the words of command."

"If volley firing is to be prolonged, it is better to divide the men into parties not exceeding a section or group, according to the distance from the enemy."

"If the volleys are intended to act as a surprise, a whole half company may fire."

"Volleys are especially effective when closed bodies of the enemy suddenly offer a good mark."

"Rapid volleys are justified on moving troops which will only be visible a short time."

"In the offensive, volleys are generally employed at the beginning of the action and during the "approach." After the position has been assaulted, volleys should be used to pursue the retreating enemy, and to get the men in hand again."

"In the defensive, volley firing should be continued as long as possible."

"The size of objects which volleys may be fired with effect at different ranges, is as follows:—

At 800 metres, on an object the size of a group.

At 1,000 metres, on a line having the frontage of a half section.

At 1,200 metres, on a section in line or on a section of artillery.

At 1,500 metres, on lines of company, or half company columns, on artillery and on cavalry.

At 2,000 metres, on troops in column of route, or in mass."

"These rules are not absolute, and the distances given may be exceeded, if the atmospheric conditions are favourable, and the range can be easily got."

"On the other hand, the distances given are excessive, if the ranges are uncertain, or if the enemy is partially hidden,"

"Independent firing (*feux à volonté*) and controlled independent firing (*feux à cartouches comptées*) are much more difficult to control than volleys, and are less easily concentrated on the same objective. They are chiefly used at distances where the trajectories are so flat that errors in range have little influence on the effect of the fire."

"When great intensity of fire is not needed only the best shots of each group fire."

"Normally, the best shots remain with their groups, but during the occupation of a position, during the approach, in attacks on artillery, and in operations where the reserve company wishes to employ accurate and long range fire, the Captain may form one or two groups, commanded by an officer or non-commissioned officer; out of those men who are marksmen and have very good eyesight."

"In any case then, groups should not quit the immediate zone of action of their company."

"When the attack is commenced, they should at once rejoin their squads."

"Rapid independent firing (*feux rapides à volonté*) and magazine fire (*feux à répétition*) are employed at the decisive moment of the attack. They may also be used at any distance, when the enemy suddenly offers a very vulnerable mark."

"Magazine fire is only commenced on the order being given by an officer."

"The magazines are filled before the troops deploy for attack, and during the action every effort must be made to keep the magazines filled."

PART II.

NOTES ON THE FIRE REGULATIONS AND ATTACK FORMATION OF THE FRENCH ARMY.

One of the most noteworthy points in the French fire regulations is the restricted use made of volley firing. It is not that they underestimate the advantages of volleys, for those quoted in the regulations are practically the same as the advantages enumerated in our own drill book. Yet the French do not consider it possible to continue volleys after the "*marche d'approche*," during which the companies are successively broken up into sections, half sections, and groups or "squads."

As soon as the men are extended, fire is carried on by individuals, at each halt, and the desultory dropping fire thus produced would not appear to be very effective.

Since "Infantry Fire Tactics" was written, volley firing in the attack has become a sort of creed with us, and it is invariably continued until the decisive moment just before the assault.

Now, although good steady volleys undoubtedly produce the greatest and most intimidating effect on the enemy, badly delivered, unaimed volleys would as certainly fail to subdue his fire and destroy his morale.

A certain point in the attack will be reached, sometimes sooner, sometimes later, according to the strength of the enemy, or the discipline of the attacking troops, at which the men will no longer be collected enough to listen to the words of command.

Picture a line of men arrived at a certain distance from the enemy's position, hot, tired, and highly excited. Bullets are whistling past and men dropping here and there. The order is given to fire volleys: a section comes to the 'Present,' one or two men fire prematurely, the rest loose off a ragged and ill-directed volley. Men to the right and left fire out of turn, and suddenly the line breaks out into a confused and almost unaimed fire. Hoarse and perspiring, the section commanders and officers endeavour in vain to steady the men or to stop the fire for an advance. But although volleys have become an impossibility, there is no alternative, the men have not been trained to any other kind of fire.

It is, however, recognized that independent firing can be quickly stopped, when used at the decisive moment, just before the assault is delivered; and this principle can be extended, so as to make use of independent firing, *under control*, when volley firing breaks down. The men must be rigidly trained to cease firing on the sound of the whistle, penetrating through the din of the fight. It is easier to obtain the discipline requisite for this, than that necessary to secure effective volleys.

It is one of the weaknesses of volley firing, that it lies so much at the mercy of the one or two nervous excitable men in each section. Independent firing might be used with effect in the attack in some such manner as follows:—

As soon as the Captain of a company saw that the men were becoming too excited to fire good volleys, he would order independent firing, thus *taking the initiative*.

The leading sections, having made their rush forward, commence independent firing on the order of the section commanders, who give the range and the objective. After a few rounds, the whistle is sounded, and the men cease firing; the left sections rush forward up to the line and commence firing until stopped by the whistle, when the right sections again make an advance. The firing line continues thus to approach until within about 250 yards of the position. If the enemy is not then dislodged, the whole line fixes bayonets, and reinforced by part of the reserves, doubles forward to 150 yards from the position, halts, and pours in a rapid independent fire. With troops armed with magazine rifles the magazines would be emptied at the enemy. The firing line then charges the enemy with, or without, the aid of the second line.

A very noteworthy point in the French regulations on the attack, is the preparation of a position for defence by the third line, during the "approach" and preparations for attack by the assaulting lines.

In some cases, where the nature of the ground permitted, this position might be pushed far enough forward to enable the troops of the third line to cover the approach and deployment of the rest, and to assist by long range volleys in subduing the fire of the enemy's artillery and advanced posts, and perhaps fire on vulnerable portions of the

enemy's position during the attack. It would form a most valuable rallying position in case of a repulse. Machine guns also should find here a great scope for action.

When French battalions are brigaded together (as in the case of a regiment, brigade, or division) no attempt is made to split them up into first, second, and third lines. Each line is composed of a battalion or of several battalions, and units are kept intact as much as possible.

In the case of a battalion acting alone, no regular second or third lines are formed, but a "Special Reserve" is kept in hand, under the direct orders of the commandant.

Although theoretically, on a level plain, each portion of a battalion split up into a first, and second, and even third line should come up and join the corresponding fraction in front, practically this would not be the case, and the battalions would be broken up and separated; while there would be little cohesion within each line itself.

Very free use is made of the supports and reserves during the attack. It is considered that the former would be absorbed before the firing line has advanced to within 450 yards of the position, and that then the reserves would be drawn on. It is not expected that the firing line could advance with vigour under a heavy fire without constantly receiving "fresh blood."

Although the chief function of the second line is to carry the firing line on to the assault, it may, if the defence is obstinate, have to send forward sections to replace the exhausted reserves of the first line, and impart fresh vigour to the advance.

Great latitude is given to the officer commanding the first line in deciding whether to wait for the second line, or to rush the position with the troops at his disposal on a favourable opportunity, when the enemy shews signs of giving way. By taking advantage of the moment a firm lodgment may be obtained in the position, whereas if the enemy has time to bring up reinforcements, the defence may become steadied, and shew a bold front again.

The French Attack Formation adapted to British Troops.

It is interesting to trace out how the attack may be developed, on the line of the French formations, by troops having the organization of the British army.

A "Brigade" of three regiments has the same composition as a French "Regiment."

The three lines of attack would each be composed of one battalion.

The first line would have four companies in the firing line and four in reserve.

The leading four companies would each extend two sections and keep two sections as supports, while the reserve companies would be broken up into sections and follow in echelon.

With a single regiment of eight companies a frontal attack would be carried out somewhat as follows:—

As the regiment approaches the enemy, one company is sent forward as an advanced guard to feel for the enemy, drive in his advanced posts, and make him deploy and discover his position.

If the advanced posts are strong, two companies may be employed for this purpose, but they must be careful not to get involved in a serious combat with the enemy, and thus commit the commanding officer to a premature action.

A frontal attack having been decided upon, the Colonel extends the fighting line by sending two companies forward, to the right and left of the advanced guard company.

Each company places two sections in the firing line and two in support, and advances by its centre, the middle company being the company of direction, and the distances between companies preserved as much as possible. The advance is continued as long as possible, until it becomes necessary to extend the men in the usual manner. This will generally be about 800 or 900 yards from the position, but it depends on the nature of the ground. Fire is commenced when it is necessary to reply to the enemy's fire, and is carried out by section volleys.

Three companies form the "reserve," being subdivided into sections, which advance in echelon.

Two companies form the "special reserve," kept in hand by the Colonel. It guards against turning movements or counter attacks of the enemy, and the attacking companies rally behind it in case of repulse.

At some point of the advance, volleys will probably be found to be no longer possible, and controlled independent fire is resorted to, in the manner suggested in the notes on the French fire regulations.

At about 450 yards from the position, the supports will generally have been absorbed, having been sent forward by sections into the gaps in the firing line caused by the men closing in on the centres of companies.

The reserve draws nearer to the firing line, replacing the supports. Being in echelon, some of the reserve sections are about 150 yards, and the rest about 250 yards behind the firing line.

The advance proceeds by rushes of companies, the centre company leading, and each reinforcement generally determining a movement forward. Portions of the reserve strengthen the firing line during this advance, if necessary.

At 250 yards from the position, bayonets are fixed, and a hot independent fire is poured in on the enemy. If he is not driven out by this fire, other portions of the reserve are brought up, and a rush made by the whole line to within 150 yards, and a rapid independent fire, or magazine fire commenced. The last portions of the reserves are brought up, and the line charges with loud cheers.

If necessary, the reserve having already been absorbed, portions of the "special reserve" should be sent forward to carry the firing line on to the assault from the last halt 150 yards from the position.

If the attack succeeds, the special reserve is brought up quickly in formed bodies, and disposed to resist counterattacks.

If the assault fails, the special reserve must sacrifice itself to allow the other companies time to rally behind it.

In this formation 3 companies of 100 rifles each, the files being extended to 3 paces interval, would occupy a front of about 230 or 240 paces. Extended to 4 paces interval, they would occupy about 300 paces of front.

Two French companies of 200 rifles each, extending each 150 rifles, occupy, according to the "Ecole de compagnie," a front of 400 paces.

**SPEECHES DELIVERED IN THE AUSTRIAN DELEGATIONS ON
MEDICAL SERVICES IN THE FIELD,**

2ND AND 3RD DECEMBER, 1891.

By

Dr. Billroth. | The War Minister. | Count Falkenhayn.

(Communicated through the Director-General, Army Medical Dept.)

December 2, 1891.

DR. BILLROTH.

GENTLEMEN OF THE DELEGATIONS,—About a month ago a healthy young man was brought to my surgery ; a few hours before the lower part of his left leg had been run over by a heavy wagon. When I took off the temporary bandage, which had been skilfully put on by the officials of the Volunteer Aid Association, a round, somewhat contused wound, with a number of bone-splinters in it, was displayed in the middle of the lower part of leg. I said to my audience, "See, this is how a gunshot wound looks, when the projectile has struck the bone." I sent for a number of bone fractures from the Museum, which I had brought back from the 1870 war, and showed them, so that my pupils could form an idea as to what this kind of injury looks like.

I then went on to speak of the different effects on the bones of the Chassepôt bullet and Prussian elongated leaden bullet. Then I mentioned modern fire-arms and smokeless powder, and remarked that a consequence of the enormously increased penetrative power of the Mannlicher rifle-bullet will be, that the projectile, after piercing a bone, will continue its course and hit several more men who happen to be in the line of the trajectory. On the other hand, the force of the old projectiles was generally expended by setting up against a hard bone, so that one could reckon with some certainty on finding the projectile in the wound when a bone was struck. I then added that it is absolutely necessary, in view of the, in all probability, greatly increased number of wounded in a future war, to increase the number of bearers and sanitary troops, since the establishment of these units is altogether insufficient as at present fixed by us.

I noticed that these remarks made a decided impression on my audience, for one's eyes get sharp after seventy-two terms of academical teaching ; but I had no idea that my remarks would have the far-reaching effects which ensued. The next morning there was a report of my clinical lecture in the local papers, as is often the case, But a few days later this report appeared in many foreign papers, and cuttings were sent me from newspapers, political as well as medical, from France,

England, Italy, and Russia, all of which printed this report, with a request to forward the text of the lecture, which was assumed to have been delivered by me and to be already in print. I had, however, delivered no special lecture on the subject, but only a few incidental remarks on clinical surgery, nor had I the intention of writing upon the subject, especially as all that I knew about the effects of Mannlicher projectiles had been told me by others. I am still receiving these communications from foreign papers, and as I fortuitously made use of the expression "the projectile of the Mannlicher rifle," it now seems that this rifle is causing a terrible scare before it has ever been used in war.

I am not so foolish as to believe that my individuality is of any weight in this business. But there are certain thoughts and impressions which lie half-formed in the brains of nations, and which only need a partly accidental impulse to make them flash forth, swift, clear, and strong. And the thought in this case is this: "*Are steps taken to better the means of aid to the wounded in proportion to the increasing development of destructive agents.*"

There is good reason for the forcible expression of this thought in these days, when the Army consists of our sons and brothers, our kith and kin.

Before going into this question, we should seek to establish *why* an opinion has gained ground, that destruction will be so greatly increased by the use of these new projectiles and smokeless powder. There is not the smallest doubt that this is counted upon in military circles, for otherwise these matters would not have been submitted to us, nor, indeed, introduced at all.

As to military-surgical experiences of former wars, these have taught us to fear artillery less than soldiers themselves. For we find that the number of men wounded by artillery fire is remarkably small.

I embraced the opportunity of seeing the wounded after the battles of Weissenburg and Wörth, where a large force of artillery and also of mitrailleuses was employed. I also visited all the other hospitals later on, and frequently discussed the subject with my colleagues, and everywhere it was remarked how few were the wounds caused by artillery fire, and that there were none worth mentioning caused by cavalry weapons; cuts and stabs are the greatest rarity in field hospitals. To express it in percentages: about 80 per cent. of wounds are caused by rifle fire, 15 per cent. by artillery fire, 5 per cent. by cuts and stabs. It was formerly said that the effect of round shot and of shell was such that men injured by them died on the spot.

In 1870 the wounds of all the men were registered, whose bodies were thrown into the common graves immediately after the battles, and no new proportions were arrived at.

Hence the attention of military surgeons is directed by these facts principally to small-arm projectiles. What changes will be caused by the new projectiles and smokeless powder? Nobody can say from experience; one can only forecast. One forecast which we hear is, that things will not be so bad, that people will shoot at such long ranges that they will hit little or nothing; that the tendency will be to attempt to

manœuvre the enemy out of his position. This was just Moltke's aim in 1870, but it could not be done without great battles. In fact, troops are not obliged to change position. Moreover, to manœuvre the enemy out of his position, certain favourable conditions of terrain are necessary, and an at least local superiority. The Germans in 1870 ran up against four great fortresses; and even if this had been possible without battles, and if the French had had enough troops to attack from outside, the everlasting manœuvring must have come to an end; it must come to hard blows sooner or later.

As to the struggle between great masses of troops, that is the phase of warfare in which discipline and military culture exercise the greatest effect, and here, perhaps, personal courage is comparatively a very subordinate factor. But just in such cases, where several battalions stand one behind the other, the number of wounds inflicted will be far greater owing to the greater precision and range of the newest projectiles, unless especially favourable conditions of ground afford effective cover to the whole body of troops exposed, even whilst retreating.

Hence, when masses are struggling, the number of severely wounded men, and especially the number of injuries to bones, will be far greater owing to the above-mentioned increased power of penetration.

But, gentlemen, we need by no means assume and found our argument upon the severity of injuries; that means difficulty of treatment later on. It is the universal custom of war that every man who is slightly wounded, but bleeds freely, goes back to the dressing station. Not the number of severely wounded men, but the absolute number of men who are hit, determines the loss in men to the General, and we can predict that the latter number will, in all probability, be greatly increased by the new weapons, to say nothing of severely wounded men.

The soldier looks upon the incidents of the great mass struggles as a duel. He hardly sees his opponent at all; he does not shoot at single opponents, but only at the mass; to a certain degree he shoots only at the enemy collectively. When he has got his knock he goes off to the dressing station. He cannot judge on the spot whether his wound is slight or severe.

You will grant that in 1870 two *brave* armies were opposed to one another, and yet this conduct of slightly wounded men is the custom of war everywhere, and the men cannot, at bottom, be blamed.

As to rapidity of fire, this is, upon the whole, not very greatly increased with the new projectiles. Still, it is virtually increased by the fact that you can see much better and longer where the enemy is. Formerly both sides were wrapped in an immense cloud of smoke after firing a dozen shots, and then they went on firing at each other's smoke. Now they can nearly always see one another distinctly, and can therefore keep up a more accurate rapid fire, and for a longer space of time.

Now as to the greater length of trajectory of the new projectiles, you may say:—What does that matter—put the dressing stations a few hundred paces further back. If they were, say, 500 paces to the rear before, then they will be 700 or 800 paces to the rear now. Quite

so. But for the bearers, who have to carry a heavy man weighing 18 or 19 stone with his kit, upon a stretcher, this increased distance means not only an immense increase of labour, but also makes the journeys much longer in point of time; consequently far fewer wounded can be transported from the battle-field to the dressing station in a given time. Just try this carrying for 500 paces or even 700—800! (Hear, hear.) It is no joke, and for any length of time absolutely impossible. (Hear, hear.) Now you cannot set up a dressing station, at the regulation distance from the corresponding army corps, &c., in the glare of the sun or in the rain. You must have some sort of cover for it, a house, a ditch, a patch of wood. Not that the Surgeons are wanting in devotion in the enemy's presence, but what is to become of the wounded if the surgeons get shot? You may say that they are protected from this by the Geneva Convention. Yes, but what use is the Geneva Convention if your own side retreats towards the dressing station, or the enemy advances, and you find your dressing station in the firing line? This means shifting, hunting up a new place, and the wounded must set to work and find this new place. No one can form a true idea of these difficulties who has not been through them himself.

The increased number of wounded, therefore, must entail a great increase in the number of bearers, which in our service is at present very small and insufficient. Yes, we must even come to the conclusion that, in future, it will no longer be possible to remove the wounded from the field by means of bearers, unless it is to go on for days together. Hence it will be necessary to place a great number of light carriages, even close behind the line of battle, for the purpose, not only of transporting the wounded to the field hospitals, but also to get them away from the battle-field itself, provided that the terrain admits of it.

Before closing these remarks on battles in the field, I cannot help remembering a psychological factor which I merely touched upon before, namely, that the soldier looks upon such a battle as a great political duel, after which there comes a kind of reconciliation, as after duels in private life.

Although in the numerous well-organized hospitals at Mannheim we could manage to separate the French officers from the German, this was not always practicable with the men. I never observed that this led to any unpleasant feeling amongst the wounded; even the Turcos were quite good-tempered among the Germans. But on one occasion this good temper was rather overdone in my opinion, and left a bad impression on me.

When I arrived at Neustadt, in the Palatinate, on the morning of August 6, 1870, by troop-train, the first train full of French prisoners from Weissenburg was standing in the station. There was a hideous noise going on; German soldiers were singing the "*Wacht am Rhein*," there was a train with 100 bellowing cattle on board; the French prisoners had been given so much wine by the good Palatinate people, that they were tolerably cheery, and were singing the "*Marseillaise*." When our troop-train moved on, the French waved to us, with "*Bonne chance, messieurs! bonne chance!*" (Laughter.)

Smokeless powder will also have marked influence on another form of battle, *viz.*, on the storming of strong localities. Here manœuvring must stop. Every army occupies a certain number of these points and leans upon them in battle, and the possession of them ensures the security of the position. The storming of such places can only be effected by the greatest personal devotion of the soldier.

Here personal courage is the paramount factor, and especially the courage of the officers. They go in front, and carry their men away with them; by persuasion they will seldom get men to rush into probable and sudden death, be the men otherwise ever so well disciplined.

At the action of Weissenburg, the first of the great Franco-German War, both sides were conscious of the immense moral effect which the victory would exercise upon the further course of the war. The storming of the walls, penetrating at the gates where the bridges were drawn up, the street-fighting, the storming of the strong Château of Geissberg, all this required heroism. In storming the latter point the Colonel fell first, then the Captain, then the First Lieutenant, and only the Fähnrich succeeds in getting into the yard of the château alive. And the French fought like lions also.

I still remember a poor young Second Lieutenant, a native of Paris; he had been shot in fourteen places, and still he stood there with the colour and his sword, till his thigh was shattered and he fell. The same kind of thing happened on the German side.

In these kinds of attacks, the result of using smokeless powder will be that artillery may be more easily disabled than formerly, for the guns in action will cause but little smoke, and the detachments will be more easily and longer visible, and will therefore be in far greater peril.

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Thus I am convinced that in *every* form of fighting the increased penetrative power and greater range of modern projectiles, and the use of smokeless (or nearly so) powder, will in future not only cause an increase in the number of wounded, but also in the number of severely wounded men.

Gentlemen of the Delegations, I will now tell you how all War Ministers are wont to answer these views.

First they say: "Great battles are like phenomena of nature, it is impossible to provide for everything that they may bring forth." This I can hardly admit. It is a natural phenomenon impossible of prevision, when 5,000 people disappear from the face of the earth, as lately happened in unhappy Japan, in consequence of an earthquake. But we now possess so many good statistical works upon recent wars, that we can very well work out a calculation of probability as to dead and wounded.

Passing over earlier and less accurate works, we have the four-volume work on the American Civil War, and, before all, the classical work of the German General Staff on the war of 1870-71. We can gather very important deductions for the future from the data of the various battles, which give us exactly how many combatants were

opposed to one another, the number of dead and wounded, even the names of the non-commissioned officers who fell.

When so-and-so army corps or regiments fight, there are so-and-so many wounded men, at least according to the present style of fighting, or rather, the late style of fighting. Whether or not these proportions will now be changed is an entirely new question.

We will consider solely the proportions as they were in 1870. Merely to indicate how such calculations may be arrived at, I take as an example, the data of the battle of Gravelotte-St. Privat. Here we find one of the most extensive battle fronts that ever was seen.

The battle began at 12 noon, and was over at 8 P. M. The Germans had 5,000 killed and 15,000 wounded. From my 1870 experiences, I reckon two-thirds of the wounded as slightly wounded, only one-third as severely wounded, which must be carried from the battle-field to the dressing station. Many of the slightly wounded men with grazes, gunshot flesh-wounds, in the extremities, &c., could, after bandaging, be quickly shipped off by hospital (railway) trains. There remain, therefore, 5,000 severely wounded.

If we assume as the greatest performance possible, that in eight hours a stretcher with two bearers does not journey from the battle-field to the dressing station ten times—an already highly improbable assumption—we find that 500 stretchers with 1,000 bearers would have been requisite; but, as the Germans were victorious, they had to take over the French wounded also; the number of French wounded was less, certainly, for the ground favoured them, and they had a better position, moreover, the Germans were the attacking side, whilst the French could retire from their hills into Metz,—altogether 10,000 severely wounded would have had to have been transported with 2,000 bearers.

This is, as I have observed before, merely an example of the method which may be followed in making these calculations; for I have already expressed an opinion that all this carrying is in war absolutely impossible of execution. It is clear that the Aid Associations can do relatively little, especially in first line.

With us, the Teutonic Order of Knights, with their ambulance park, are alone permitted to assist in the first line. The Maltese Society has organized excellent hospital trains. The Red Cross Society looks after the reserve hospitals. Well, now we are told that country vehicles may be used for transporting wounded, provided they are properly fitted up. I must tell you the following incident:—On the 8th August, 1870, I had been loading up a number of slightly wounded from Wörth—the battle was on the 6th—on the railway trains standing ready for them, and the trains had just left. I was going into the town when I met a cart, driven by an Alsatian peasant; a Turco sat on the box, the Arab always *en pose*, his burnous artistically draped; in the cart lay a Bavarian, a Frenchman, and a Prussian, all badly wounded, and in a most miserable state; round the sides were hung the arms and shakoes.

Since then, when I see a game cart in the autumn, hares hung round the sides, deer, wild boar, and roebuck inside, my ideas are at once associated with this Weissenburg country cart carrying wounded.

The unfortunate men had lain the whole night and part of the following day on the battle-field. They were eventually found in a vineyard, and it was a piece of luck to find some sort of a conveyance to bring them along; for the Alsatian peasants had at that time not been sharpened up, they did not know what war meant. Later on no more carts were to be found, for when once the countryman knows that his horses and cart may be taken from him at any moment, he manages to hide them uncommonly well or send them away a long distance. So this expedient is a very poor one also.

Now, the great objection raised by all superior officers is this, that such a large increase in the baggage will be necessary, to say nothing of the cost, that it will be no longer possible to move the army as strategy demands.

This I partly admit, but there are many other things which increase the baggage. Take, for example, the telegraph and telephone wagons. With the help of these it will be possible to fetch up the baggage quicker than formerly. Many things have been added to the trains, and there are many more to come. Why should just an increase of the train for the sake of the wounded be put out of the question? Strategy has been forced to gradually change in accordance with these conditions, and it must take these things into consideration. Surely, strategy is not to be the only science to stand still; it must move with the times, and must reckon with given means.

Many things have changed, and many more will change, but what the changes will be we cannot say. If aeronautics make further progress, it will come to raining down bombs lightly cased, say with aluminium, upon the combatants; or imagine electrical science so far advanced, that one can dart down lightning on troops from a balloon. This is by no means absolutely impossible; these are no exaggerated fauces. Strategy will have to reckon with such things also.

I can by no means admit that it is impossible to make changes in this direction too. The thought which now inspires the minds of people universally, and has become so well-defined that it must be reckoned with, is that help to the wounded must keep pace with the increased power and great development of ballistics.

There are still two points which I should like to touch upon. First, the illumination of the battle-field at dusk and at night by means of the electric light. I regret that up till now we are still without the necessary apparatus. The idea of lighting up the battle-field in sections by great reflectors to facilitate search for the wounded has been spread far abroad from Vienna, thanks to Baron Mundy's untiring energy. He has spoken on the subject in London, Geneva, and latterly in Frankfurt, has demonstrated the idea, and France, England, and Germany all possess these apparatus; we alone are without them. I wish, therefore, that the higher military authorities would turn their attention to the subject.

December 3, 1891.

F. Z. M. FREIHERR V. BAUER (Minister of War).

* * * * *

If I may be allowed to select from the exhaustive speech of the hon. member those points which concern the war administration, and which are to create an impulse for future progress, these points would be three in number, as follows:—

1. A desire for an increase of the bearer-personnel as the means of transporting the wounded from the fighting or firing line to the place of aid.

2. An increased establishment of vehicles, in order to secure communication with establishments in rear.

3. The introduction of mobile illuminating apparatus, to provide for the lighting up of the battle-field at night.

As to the first point, I do not altogether believe that a material increase of bearers will afford us the desired remedy. It must be laid down as a postulate of aid to the wounded, that a wounded man must be properly attended to within twenty-four hours. This is what must be aimed at and kept in view, irrespective of the self-help which a man is capable of if slightly wounded, by making use of the small packet of bandaging material which he carries with him.

The thing to be done is, then, to get a man back from the fighting or firing line to the place of aid; this is the first of the places where the regimental surgeons are assembled to afford assistance. Conditions of ground must here alone decide what the bearers can do in the way of carrying to and fro with the stretcher they have at their disposal.

Now if we increase the number of bearers and expect them to go backwards and forwards in this way, they will, every man of them, be shot down, unless the conditions of ground are exceptionally favourable. They are worse off than the men in the firing line; *they* seek cover, and if they cannot find it they make it, if the ground admits. To do this they have their Lunemann spades to entrench themselves with, in accordance with our regulations.

Men wounded in the firing line are either slightly wounded, so as to be able to go back without assistance, or so wounded that they must be led back to the place of aid, or, finally, severely wounded, in which case they must be carried back on stretchers.

As to the first two classes, I have learnt by experience that, unless absolutely incapacitated from further duty, they preferably avoid the way to the dressing station, for this way is far more dangerous to them than remaining near the fighting line. However that may be, we have, until now, organized a bearer-patrol of three men per company, i.e., per sub-division. These are the men who carry the stretchers; they are instructed during peace time in first aid, and are provided with the means of affording the wounded man a temporary relief. All these arrangements are thought out and considered in every light. The question is, whether a *material* increase of these bearers will answer the purpose.

In any case, I reserve to myself the task of having the subject thoroughly inquired into. I accept with great pleasure the suggestions of the hon. member, who is able to speak as an authority on the subject. But, on the other hand, our military measures must be kept within certain maximum limits, and this applies to a material raising of of the bearer establishment.

I should like to add that the best time for getting the wounded away from the firing line is when position is changed, either in advancing or retreating.

When position has been changed, when by the advance such a distance from the troops in front has been gained as to at least lessen the danger, then in the time for the bearer-patrols (four per battalion) to begin their work, and search a space dependent upon conditions of ground, say about 800 paces per battalion.

The practical training of the bearers in these duties may be seen going on every summer at the greater manœuvres. Every effort is made to make their task clear to them in peace time. In winter they are trained as far as possible in practical medical duties on a small scale.

I hope and wish that these means will suffice, and would add that the distance (to the rear) of places of aid and dressing stations, as given in figures, is by no means to be adhered to under all circumstances. A place of aid is properly situated when under cover and as near as possible to the firing line. All regulations on this subject are kept as simple as possible.

This also holds good with reference to the distance of the places of aid from the troops in action. The distance is by no means the ruling factor, any more than the distance given to be observed by the reserves from the fighting line.

As to the second point, viz., the increase of vehicles and establishment of communication with the rear, precise and binding instructions are laid down in our Regulations for Medical Services. These instructions are, that when an action commences, all available vehicles of whatever kind, empty regimental provision and meat wagons, empty supply-column wagons, vehicles otherwise requisitioned, ambulances of medical establishments in rear, &c., are to be brought up for transport of wounded, in order to satisfy requirements as far as possible. This order is categorically laid down in our service, and I think I have shown that everything that can be done in this direction, will be done.

The third point refers to the illuminating apparatus for lighting a space where fighting has been going on and where dead and wounded are still lying, or in other words, the battle-field. This is a humane measure which no one views with disfavour, and many experiments have been made in this direction. I was present at Baron Mundy's practical experiment. On that occasion a brilliant, staring illumination was obtained of points where the light fell, but, at the same time, I observed that the deeper shadows cast by swells of ground were so black, that the men were not discovered, and recourse had to be made to lanterns or torches. And all this happened in a place, in the like of which we shall not fight, viz., in the Trabrenplatz in the Prater.

At that time, so far as I remember, I proposed that a sharp fight should be held on the Galizyn Berg, so that conditions of ground might have their proper effect; but I believe this was not done.

Further, the introduction of illumination wagons would entail an increase of baggage.

Now, an increase of baggage is of itself a very objectionable factor. The baggage gives us a vast amount of trouble, and if you remember the difficulty of getting the baggage columns along, you will see that one must literally reckon with every single wagon. This circumstance would not of itself prevent us from considering the feasibility of introducing such wagons, but the question must first be decided whether these wagons could in all cases, and especially at the right time, be brought up to the place where they are wanted. We need further experience on this point. Foreign Governments, so far as I know, have also only got to the experimental stage, and this service has nowhere been introduced as a definite measure. Experiments and trials have been made with wagons, and I will do the same. As soon as we attempt to introduce this kind of apparatus, the question of building a suitable carriage at once comes to the front, and it is a very difficult one.

There is no want of lighting apparatus. The problem is to fix the heavy apparatus on a wagon which admits of easy transport, and can be brought up on any kind of ground. We have among our transport material a certain kind of heavy wagon which we still use, but it is not sufficiently mobile, so we must think of some lighter conveyance.

I reserve the privilege of informing the House further on this matter when I have studied it, and gained further experience in the matter, and when foreign experiences are at my disposal; for we profit by everything and everywhere we possibly can.

* * * * *

December 3, 1892.

COUNT FALKENHAYN, Chairman of Financial Committee on Army

Estimates.

Gentlemen,—I hope you will allow me to say a few words in order to express my views on the subject of the debate on Clause 18, certainly one of the most important and interesting which has taken place in discussing the War Estimates. We have deduced two precepts from the so comprehensive and interesting speech delivered by the renowned—I may say, not merely Surgeon, but also—War Surgeon Billroth. The first precept which I have laid to heart in my present capacity, and yet as an outsider in this subject, is the intimation that, in a future war, the means of aid to the wounded provided and ensured by the State will in no case suffice. Gentlemen, they have never sufficed in past wars, for it lies in the nature of things; and these means will

not suffice in future wars, even if the War Ministry, as his Excellency the War Minister has promised, takes pains to add to them and strengthen them. But the lesson I have deduced on this point, but lightly touched upon by the hon. member, is the importance of encouraging those societies which prepare in peace to afford voluntary aid in time of war; I mean these organizations which have been formed in all countries under the sign of the Red Cross.

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the same time, the fact that the same person can be both a subject and an object of a relation, and that the same relation can be both a subject and an object of a relation, is a fact that is not captured by the traditional logic of relations.

For example, if we consider the relation of being a parent, we can see that a person can be both a subject and an object of this relation. A person can be a parent of another person, and another person can be a parent of the same person. This is a fact that is not captured by the traditional logic of relations, which would require us to distinguish between the subject and the object of the relation.

Similarly, if we consider the relation of being a friend, we can see that the same relation can be both a subject and an object of a relation. A person can be a friend of another person, and another person can be a friend of the same person. This is a fact that is not captured by the traditional logic of relations, which would require us to distinguish between the subject and the object of the relation.

These examples show that the traditional logic of relations is not sufficient to capture the full range of facts about relations. We need a more general logic of relations, one that can handle the fact that the same person can be both a subject and an object of a relation, and that the same relation can be both a subject and an object of a relation.

One way to achieve this is by using a logic of relations that is based on the concept of a *relation*. A relation is a set of ordered pairs, where the first element of the pair is the subject and the second element is the object. This logic of relations is more general than the traditional logic of relations, and it can handle the fact that the same person can be both a subject and an object of a relation, and that the same relation can be both a subject and an object of a relation.

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These examples show that the logic of relations is a more general logic of relations than the traditional logic of relations. It can handle the fact that the same person can be both a subject and an object of a relation, and that the same relation can be both a subject and an object of a relation.

One way to see this is by considering the fact that the same person can be both a subject and an object of a relation. In the traditional logic of relations, this would require us to distinguish between the subject and the object of the relation. In the logic of relations, this is not necessary, because the logic of relations allows us to distinguish between the subject and the object of the relation.

Similarly, if we consider the fact that the same relation can be both a subject and an object of a relation, we can see that the logic of relations is more general than the traditional logic of relations. The logic of relations allows us to distinguish between the subject and the object of the relation, while the traditional logic of relations does not.

RUSSIAN CUTTINGS, APRIL 1892.

1.—*A New Map of Persia.*—In the summer of 1891 the Journal of the Athenæum announced that a large map of Persia in two volumes with several maps and drawings would shortly appear. The author's name was Curzon.

It did not, however, appear in 1891, and people who knew said Curzon had just joined Lord Salisbury's ministry, and would not therefore publish openly a book not wholly flattering to the Government.

In February 1892 a portion was nevertheless published with a map of Persia.

All the maps up till now are small, defective, and out of date. Both Russian and English Governments have felt this, and have made up their official maps by compiling the necessary sketches of all the country between the Tigris and the Indus, from the Caspian to the Indian ocean.

The first that appeared in a complete state was Major St. Johns, on a large scale, about 23 versts to the inch, but so poor in its composition and in many places so inaccurate, that Curzon to-day passes it by in silence.

As a parallel to this map, but a much better one, must be placed the map of Persia on a scale of 20 versts to the inch worked up first in Tiflis, and afterwards corrected and completed in St. Petersburg. It is much more accurate and complete than St. John's, but also has its faults.

Curzon's map is very neat. You can see also, if you are a connoisseur that he knows the geography of Persia, Beluchistan, and Afghanistan well.

He has not put in any imaginary mountain ranges, like Peterman did in his map; the character of the country is everywhere clearly and truly depicted, and clear to read in spite of the quantity of detail. The scale is not large, 90 versts to the inch, but what a difference to the other European maps of those countries. The Russian 20 verst map must recede into the background.

Still it would be misleading the reader to bestow unqualified praise on Curzon's map. Although the author has tried to make use of every source of information, there are still omissions and inaccuracies. One of the most important omissions is that of not having made use of the topographical works of Mr. Strelwitz in eastern Khorasan and Ceistan, works of whose existence he was evidently ignorant.

Then he has left out the Russian explorations in the Karakums along the so-called Uzgun or Chardjui bed of the old An u Darya, or more accurately a number of beds stretching from S. S. E. to N. N. W.

The Bokharan dominions which are close to the margin of the map, are too superficially worked up, and not even quite accurate.

Beluchistan is wanting in detail. Its frontiers with India and partly also with Persia are not drawn in at all.

We hope Mr. Curzon will correct these errors to his new edition.

2.—The province of Turkistan was at first considered barren and

useless. It is now one of the brightest jewels of the Imperial Crown. Its prosperity is daily increasing. Letting alone figures of exports and imports, this fact is shewn by the endeavour to establish new means of communication. Water transport is very cheap and naturally the two rivers Sir Darya and Amu Darya are attracting speculators. There are two companies who run steamers on the Sir Darya.

There are two steamers now on this river, which are suitable for it, but whose engines would be too weak for the Amu Darya, whose steam is twice as strong.

3.—According to the *Novoe Vremya* the squadron in the Pacific

Ocean will this year be increased to eleven large war ships, not counting torpedo boats and other subsidiary vessels.

4.—*Exports from Turkistan*,—To the neighbouring Khanates and

to European Russia. In the year 1887,

the total value of exports was,

Roubles..... 6,137,034 ; in 1890,

Roubles.....19,103,322 was the total figure.

The nature and amount of the exports in 1890 were,

Bread stuffs 200,483 Poods.

Other grains..... 73,172 "

Flour and meal..... 845,350 "

Rice 668,297 "

Tobacco 8,224 "

Cotton 2,121,000 "

Raw Silk..... 1,114 "

Textile Fabrics.. 23,956 "

Miscellaneous.....,..... 4,384,546 "

The pood equals about 36 lbs av.

5.—A gunsmith in the St. Etienne factory has invented a com-

bination sword and revolver. The

revolver is placed in the hilt, and the

inventor claims that cavalry advancing

to the attack would be able to fire four or five shots before using the

sword.

The Invalid says this is not a new idea ; it has been tried before and found impracticable and unsuitable for war. The revolver's weight brings the centre of gravity on to the wrist, and thus weakens the force of the blow of the sabre.

It is not likely to prove a success.

1st January 1892. Amongst the works under construction of this railway were included two railway bridges taking the place of temporary wooden ones, one over the river Tedjen, a coffer-dam bridge and the other in Merv on the Murghab a tubular pile bridge.

6.—*Experiments with Felt Tents.*—The details of the construction of these tents were shewn in No. 36 of "The Invalid," 12th March. 1892.

The tent holds 32 men; it is heated by a wood fire, and is perfect protection if in a sheltered spot, and the cold outside is not more than five degrees Reamur, but if on an open plain with a strong wind, a wall of snow must be built up outside and the fire must be kept up well. The conclusion arrived at is, that with these tents, troops can camp out in the field in winter, as they are sheltered from cold, wind and weather.

7.—During the great Austrian manœuvres which are coming off in Galicia, experiments will be made chiefly in lighting up ground at night, in constructing field railways, and in reconnoitring by means of military balloons.

8.—*The importance of private companies* for flying carrier-pigeons as a sport. This article dwells on the importance of carrier-pigeons, gives a plan of all the regular military pigeon stations, in Europe (Russia excepted), shows how they have increased in the last 10 years; but then goes on to say they are very expensive, each station costing from 3,000 to 5,000 roubles a year. (A station must have at least 750 pigeons and a staff of officers)

To meet this difficulty other European nations have started private companies under the protection of Government, who shew them where to place their stations, and in return give them some slight monetary assistance and cheap railway tickets in the neighbourhood of the stations. The companies thus have their own amusement in peace time, and form an important aid to the fatherland in war.

In France there are 19 military stations, 47 private; in Germany, 17 military and 178 private (52,000 pigeons); in Belgium no military, but a large number of private stations.

One must remember a pigeon can fly over 60 miles an hour, and can keep it up for 10 hours of daylight. They can therefore vie with the telegraph, and in time of war, when a message might have to be sent where there was no telegraph or where the wires had been cut, they would be invaluable.

9.—On the 4th January 1892 an order was issued for the introduction of intrenching tools to all the infantry and a part of the cavalry of the Spanish army. The entrenching tools consist of the following:—

A light shovel 4 lbs., a hoe 1 lbs. and an axe 4 lbs.

10. Russian cavalry versus artillery. *Extract.* During the summer manœuvres at Vladikavkaz, in which, 16 Battalions, 23 squadrons, and nine batteries took part, trials were made

12. Militär Wochenblatt, 11th March.

to determine the effect of a cavalry charge against artillery in action.

The distance, which the cavalry had to pass over under fire, at the trot, gallop, and the charge, was about 1,500 paces, during which the

time was to be taken and number of shots fired by the guns was to be registered.

The batteries were formed up in line in two groups, blank cartridges being used.

The signal for the cavalry to be put in motion was given by the firing of three guns.

The first day the cavalry took seven minutes to penetrate into the batteries and 226 rounds were fired or an average of 45 rounds per battery or about six rounds per gun; on the second day the attack lasted only five minutes. One hundred and eighty-four rounds were fired, or little more than an average of five rounds per gun.

It was seen that there was a want of steadiness amongst those serving the guns during the attack. The desire to shoot as quickly as possible put the gunners into a state of excitement. It is maintained by a former essay writer in this paper, that howitzer shells would be more effective than shrapnel against cavalry charges of less than five minutes duration, as it would terrify the horses, and cause confusion, which is not to be expected of shrapnel.

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At Simla on Thursday June 16th.

The Hon'ble Lieut-General H. BRACKENBURY, C. B., R. A., in the Chair.

OFFICERS AND THEIR WEAPONS,

By Colonel M. J. KING-HARMAN.

The paper which, by the kind permission of the Council, I shall have the honour to read to you this afternoon, has been dignified by the title of a Lecture. Now a well known authority on the subject has placed it on record that, "A popular lecture demands as much art as an after-dinner speech. It should be (which it is not always) quite unlike most sermons, and all academic discourses, and leading articles; that is to say, it should be entertaining or nothing. It should not teach much; and it should never be edifying." Well I am afraid, that in spite of my utmost endeavours, you will have to agree with me that I have only been able to fulfil the last condition.

It is now seven years since I last had the honour to address a meeting in this Institute, though not in this room, and the subject then, as now, was "Officers and their weapons;" so that this is really the second time of asking: and indeed I shall be quite prepared to ask even a third time, if by so doing I shall be promoting in any way the object which I have so much at heart, namely, the efficiency of all officers in the use of arms.

Now-a-days there are three weapons with which British Officers are armed, namely, the sword, the pistol, and, (may I say it?) the pen; but the latter is too dangerous a weapon to talk about lightly, so beyond warning all young officers against a too free use of it, I will not refer to it again, but will content myself with endeavouring to awaken your interest in the other two.

It may seem strange to say so, but it is nevertheless a fact, that even so lately as 1885, the subject was one that attracted compara-

tively little interest amongst military men ; and perhaps chiefly on that account it was an unpopular one to talk about in this theatre ; but in that year the tide turned, and since then much has been written, and said about the better arming of our officers, and about instructing them in the use of their weapons ; and, what is more to the point, a certain amount has been actually done which has doubtless served to turn the minds of many in the right direction, and which, if persevered in, will bear good fruit in time, provided that that work is not allowed to stand still at the same point at which it started seven years ago, but is gradually pushed on and improved in quality, until a high standard of efficiency is attained. The subject, although, in my humble opinion, a very important one, is not a very extensive one, and therefore it is almost impossible to avoid repeating occasionally what has been written and said before.

Until the end of the 18th century the sword formed a necessary part of every gentleman's dress ; and skill in the use of both sword and pistol was considered one of the accomplishments in which civilians, as well as soldiers, sought to excel ; but after the abolition of duelling it became unfashionable to cultivate the use of those weapons.

In England there has been of late years a mild sort of revival, which has been chiefly due to the energy of such men as Mr. Egerton Castle, Mr. Walter Pollock, and Captain Hutton ; but it has been entirely amongst Volunteers and civilians ; and I am sorry to say that as yet the army has been in no way affected by the movement. In India also an increasing amount of interest has been displayed in the use of arms, for which we have to thank His Excellency Lord Roberts, and General Luck ; an interest which has been shared equally by civil and military officers alike ; therefore I feel that I am now speaking to a much more appreciative and sympathetic audience than I did on a former occasion ; and my sole object in venturing to address you now is to endeavour to the utmost of my ability to stir up in each one of you a feeling of enthusiasm on the subject, and a resolution to do everything in your power not only to become proficient yourself, but to help in every conceivable way towards making all others proficient in the use of both sword and pistol. I call upon every officer in the army to so do as a duty that he owes to his Sovereign ; and to every one who is not actually in the army I would say, that in this country you never can tell when you may not be called on to defend yourself, and that therefore at any time your own life, and with it the good of the country, may depend on your ability to make effective use of your weapons.

In support of what I have just said with reference to the army, I cannot do better than read you an extract from a speech made by our present Commander-in-Chief, Lord Roberts, at the conclusion of the cavalry manœuvres at Muridki on 28th January 1890. Referring to the assault-at-arms with which those manœuvres concluded, His Excellency said much on the subject of skill with arms.

It would occupy too much time and space to give you the whole of that valuable speech, so I will only extract such short paragraphs from it as specially bear on the subject of this paper. Referring to a famous

remark made by the great Oliver Cromwell, His Lordship said that he would venture to add that—

“Unless the cavalry soldier can manage his horse, and use his arms expertly, he is worse than nought,” after which he went on to say as follows :—

“Only recently the Government of India has sanctioned special prizes for skill with the sword and lance. This will, no doubt, cause more attention to be paid to these very important exercises, but I am not sanguine that there will be any great improvement unless the officers take an interest in them. It is quite as essential for officers to be experts as it is for their men; and I sincerely trust that every cavalry officer in the service will not rest satisfied, until he has become a thorough master of the sword and lance. It is also equally necessary that they should be able to shoot accurately with a pistol when mounted. It is not easy, as I dare say many of you found the other day when competing for the Adjutant-General's prize, but it is essential to the perfect training of a cavalry officer.”

I beg of you all to take those words to heart, as you will never get sounder advice as long as you live.

To go back much further, we have the words of that great man Sir Robert Sale, which have been often quoted. He is reported to have said that, “if an officer in India means his men to fight, he must lead them on, and, if he leads them on, he must fight in his own defence.”

Many other great soldiers have used somewhat similar words.

You would think perhaps after that speech that I quoted from just now, that there would be little left for anyone else to say; but such is not the case, because in these days events follow each other with such rapidity, that it is absolutely necessary to keep on repeating and hammering away at any particular subject for a long time, before it is possible to make any decided and useful impression on the ordinary run of people.

In connection with the revival in England, that I mentioned just now, a most interesting display of swordsmanship took place on the 25th February 1891, on the stage of the Lyceum Theatre in London, in which, in addition to those already mentioned, Sir Frederick Pollock, Professor de Bailly, and I believe the great actor Mr. Irving also, took part. This was followed by minor displays at some of the Metropolitan Volunteer drill halls; and if only the contagion had spread to the Royal United Service Institution, there would have been some slight hope of *some* portion of the Regular Army becoming infected; but unfortunately it was too carefully protected.

In his introductory paper on that famous occasion, Mr. Egerton Castle gave it as his opinion of Fencing that, “as a sport it possesses distinctive qualities invaluable for the completing and refining of an athletic education, for regulated sword play fosters, perhaps better than any other method of physical training, that paramount quality, nervous self control in the midst of the most strained muscular exertion”, and in that all must agree. It would be interesting no doubt to follow that great master through his valuable lecture on the “story of swords-

manship," but time will not admit of it, and moreover all who wish to read it can do so elsewhere.

Well, as the case stands now, if the movement spreads generally throughout great Britain, as I believe it will do, the honour of re-introducing the love of swordsmanship and of military self-defence amongst Englishmen will be fairly due to those gentlemen; whereas in my humble opinion the lead ought to have been taken by the army. There is no earthly reason why any Englishman, more especially an English Officer, should be a worse swordsman or a worse pistol shot than any one else; in fact there is, I venture to think, every reason why he should be, and why he ought to be, very much better. Wherever he goes he is essentially a leader; and as such, more especially as a squadron, troop, and company leader, I don't believe he has his equal in the world, certainly not his superior; he will lead his men against any number of any people, and his natural pluck will carry him through dangers which would appal men of many other nations; but there, unfortunately, the superiority ends, because in nine cases out of ten he is so ignorant of the use of his weapons, and is so unaccustomed to handle them, that he is practically at the mercy of any determined man who can single him out for attack; therefore I think that most of you will agree with me that, taking any two men who are equals in every other respect, the one who is most expert in the use of his weapons is likely to be the most reliable leader, and the one whom the rank and file of the army would more readily follow. Bravery is one of the qualities that we as a nation most admire and are most justly proud of in our officers, but does not it too often border on rashness, when unaccompanied by a certain amount of skill in self-defence? I think so.

When a young man joins the army, it is still occasionally said of him that he has adopted the profession of arms; but watch that young man throughout his career up to the time that he leaves the service, and see then how much he knows about arms practically. If in the infantry he will probably know all about the rifle with which his men are armed, and will probably be a fair shot with it himself; but he will almost to a certainty know nothing about the effective use of the bayonet, which forms a not unimportant part of the soldier's equipment, and which, in spite of its foreign name is essentially the weapon for the British soldier, a weapon which in past days has in their hands decided more than once the fate of Europe; and which, if we still maintain our faith in it and our pride in its use, will probably, indeed I may say will certainly, decide the fate of India in the not far distant future. Though not strictly speaking an Officer's weapon, yet it is one which he calls on his men to use, and which therefore he should be able to use himself. At any rate he ought to know how to best defend himself with his sword against an attacker armed with a bayonet. Then see what practical knowledge he has of the use of his sword. Why to begin with, he almost hates the sight of the weapon on which his life may any day depend; he never wears it, except when he is absolutely obliged to do so; he neither knows nor cares anything about its quality, or its capabilities; and as a rule so long as it is properly cleaned for parade, and the sword

knot is neatly rolled round the handle so as to be perfectly useless to him he neither knows nor cares anything about it ; though if you ask him, he will probably tell you with an air of pride that it is one of Wilkinson's best. * When he is young he goes through a mild course of single-stick play, which lasts a very short time, which he generally dislikes excessively, and which, owing to the manner in which it is conducted, is of very little, if any, practical use to him. He goes through a curious course of instruction in what is known as the Infantry Sword Exercise, the annual performance of which before the inspecting General Officer is a sight for the Gods ; and if in a British regiment, he may possibly be given a few lessons in fencing, though I have never yet known of an instance. Lastly comes his revolver, which in England is not yet a recognised part of an officer's equipment : he probably knows the name of the maker of that also ; but it is very seldom that you meet an Officer who knows anything more about his pistol than that ; he fires the 24 rounds from it that he is obliged to fire every year, and which, by the way, he has to pay for himself, and no one, least of all himself, seems to care whether he hits the target or not.

If you talk to the young man, and try to reason with him as I have often done, on the folly of being unable to use his weapons, or on the desirability of cultivating a little better acquaintance with them, he will generally answer somewhat to this effect, "Oh ! it is a nuisance and I haven't time for practice," and so on. You point out to him that in his present state of ignorance he is perfectly useless as a fighting man, but that does not appear to make much impression on him, probably because his whole thoughts are bent on some examination in fortification or in military law which he has to pass. You may then perhaps try to get him to understand, that if he is thoroughly well able to defend himself, he will also be capable of defending others, and with that you will frequently touch the spring of heroism within him, but as often as not he will say "that sufficient unto the day is the evil thereof" ; and if he was ever attacked by a man, he would have a jolly good whack at him somehow with his sword, or that he would "wang" off his pistol at him, and trust to luck, and so on.

Well, in all this it must not be imagined that I am blaming the young officer ; quite the reverse, and I say distinctly that he personally is in no way to blame for his inefficiency as a fighting man. But what I do blame is the system, or rather the absolute want of system, which makes such a lamentable state of things possible, which allows such splendid physical ability to be wasted, so many valuable lives to be lost, and under which no attempt is made to train and educate the strong hereditary fighting instincts which all young British Officers possess in the highest degree ; and which only requires encouragement and education to make them invincible.

No, we cannot, or rather we ought not to blame men for not knowing a science which we make no attempt to teach them, and which we do not in any way encourage them to learn of their own accord. So far I have been talking about the infantry officer, but the same remarks apply *mutatis mutandis* almost equally to the cavalry. Swordsmanship

does not consist in the ability to go through the pursuing practice at a canter, and the sooner that fact is recognised the better. I say nothing about the artillery officer because his weapon is his gun, though as a matter of fact, many of our best swordsmen and pistol shots have been and still are gunners, but I would venture to remark that the efficient service of those guns, particularly those in charge of heavy and garrison batteries is becoming more and more scientific and consequently more and more difficult every day ; and unfortunately the *practical* mechanical training of cadets and young officers falls most dangerously short of the requirements of that service ; indeed, so far is this the case, that unless some very radical changes are made soon in the educational course at Woolwich, the actual fighting of heavy guns will have to be undertaken by special civil mechanics, and it will become a question whether it is worth while to pay for officers at all. But here again no blame attaches to the officers themselves, who are all of them ready and willing enough to take off their coats and tuck up their sleeves, and to learn the practical working of steam engines or hydro-pneumatic mountings or anything else in the shape of machinery that you like to teach them. Regarding Engineer officers, who muster so strongly at Simla, I shall be very cautious not to say much ; but this I will say, that considering the inestimable value of each one of them, especially with a force in the field, and considering the way in which they are always exposed to danger either in surveying, or in reconnoitring, or in road and bridge making, or in the actual assault on fortified places, I do think that of all officers in the army they should be the most expert in the science of self-defence by means of sword and pistol.

I have purposely omitted any reference to Officers of Volunteers, because I take it for granted, that any man who is imbued with sufficient patriotism and high feeling to become a member of our magnificent Volunteer Force, will naturally as a matter of course have the good sense to use every endeavour to become proficient in the use of the weapons with which he is armed.

All the instruction that has heretofore been permitted to junior officers in an infantry regiment in the art of military self-defence, if indeed instruction is a proper word to use, consists in sometimes a mild, a very mild, course of single-stick play (not even under an instructor) amongst themselves, under the nominal supervision of the commanding officer once a year, and 24 shots fired from a revolver at a fixed target, all at one distance. Formerly it was not considered necessary to give them any instruction at all ; and therefore most of us were very thankful when even that small concession was made ; but of what real practical use is it in teaching an officer the use of his weapons ? I say very little, many people say it is of no use at all. What then should be done for the thousands of brave but comparatively helpless officers in our army ? The natural answer will be that they should be at once taught the use of their weapons, and be made soldiers in reality as well as in name. Certainly, but how is that to be done ? Well, I will tell you my idea on the subject, and I hope that some of you will kindly give us yours afterwards, and we can then compare them, and try if some workable scheme cannot be made out between us.

Up to a certain age, say 35 or in some cases, even up to 40, it is never too late for an Englishman to commence to learn ; but it is obviously most advantageous for him to commence as young as possible ; therefore I say all boys should be taught boxing, fencing or single-stick, or all three, while they are at school.

I believe that the Military College at Oxford is now the only school where such exercises are enforced, although at Winchester it is much encouraged ; and I know that at most other schools none of them are allowed. Then for the entrance examinations to Woolwich and Sandhurst a very large number of marks should be given for all exercises with arms, more especially for revolver shooting and fencing, either or both of which should be substituted for Latin.

For instance, if a man can gain a possible 1000 marks for scanning a Latin verse, or extracting the cube root of .01 or any other scholarly performance, I would give him 20 0 marks for being able to cut out the ace of spades six shots in succession at different distances, or for any other similar *soldierly* performance. During his stay at the academy each cadet should be steadily practised in some or all of these exercises, and at the final examination still higher marks should be given for them than at the entrance. The result of such a system would be, that every officer, on joining the army, would be, to a certain extent, a trained fighting man ; at any rate he would most surely have a far better knowledge of the use of his weapons than any young man has who joins now-a-days. I am strongly of opinion moreover, that the commanding officer of a regiment should be held responsible that constant and systematic practice in the use of arms is kept up by all officers under him ; and indeed I would go so far as to advocate the addition of foil and bayonet fencing and revolver shooting to every course of garrison instruction ; a trained instructor being attached for that purpose to each school. I am aware that the length of the garrison course has been lately reduced from four to two months, and that it would be impossible to cram anything more into that short time, but it would be very easy to extend it to four months again, to exact the same amount of book work, and to add a practical course of instruction in military self-defence in which all officers should be compelled to attain to a certain degree of excellence, which course should not be crammed into the extra month, but should be spread over the whole term.

My old friend Lieutenant-Colonel E. Lloyd of the 1st Punjab Cavalry, a former garrison instructor, used to be most keen on this subject, and I often used to discuss it with him. A very useful paper on military self-defence was contributed by him to the Institute Journal about five* years ago ; and I feel sure that he would gladly assist to start such a scheme.

Of course I take great interest in athletics, gymnastics, and physical exercises generally, and I think that they should be invariably encouraged as much as possible, but I am strongly of opinion that they

* Journal of United Service Institution of India, Vol. XVI, No. 71.

should be kept quite distinct from military self-defence as far as officers are concerned. It is no doubt very desirable that every officer should be a good runner, or a good gymnast; but neither are qualifications which are really necessary to him as an officer, whereas swordsmanship and shooting most distinctly are so.

Many of you no doubt read that famous speech made by Lord Wolseley on the 28th February last year at the conclusion of the gymnastic competition in the Leinster Hall in Dublin, in which he was reported to have made use of the following expressions :—"The methods of to-day were to cram the head with knowledge, and to let the body take care of itself, making men, as it were, mere tadpoles, all head and no body: he had seen such men, and all he could say was, that he would rather belong to a nation where the men were of fine physique, with broad strong chests, splendid arms and legs, and fine muscles, than to a people with abnormally developed heads, wearing spectacles, and having only poor bodies. He was not in favor of the tadpole type, which he had certainly met from time to time."

There is not perhaps anything very definite in all that, but it all bears indirectly on what I have been hinting at, namely, that physical studies and mental studies should go hand in hand, and that the mind should not be excessively strained at the expense of the body.

I cannot help thinking that we make a very serious mistake in making any young man, especially one who is destined for the army, consider that the sole aim and object of life is to pass examinations in books only, and to exact so much mental study from him just at the time of life when particular attention should be paid to the development and training of his body generally. The result is often, though not always, the production of a tadpole; but it undoubtedly acts prejudicially to the production of a leader.

This naturally brings me to one point, regarding which I should like to give my opinion in such an emphatic manner, as to avoid all possibility of misconception; I refer to that fictitious standard which is known as the "Figure of Merit." I am absolutely opposed to the idea of having anything of the sort introduced in connection with swordsmanship or pistol shooting. Let there be as much inter-regimental competition as you please, as that produces a healthy form of rivalry, which will be highly advantageous: but let us have no such thing as a "Figure of Merit."

After this digression, let us go back to the actual subject of this paper.

There is little doubt that of late years the practical instruction of officers in the use of their weapons was rendered very difficult owing to the following causes :—

- 1st.—The faulty construction of his regulation sword, which was so made, that it was neither suitable for thrusting nor for cutting.

2nd.—The faulty construction of some kinds of revolvers; the number of different patterns of revolvers; and the prevalent idea that there was no necessity for an officer to be able to shoot well.

Happily, now a new pattern of sword has been introduced for infantry officers, about which I should like to say a few words; and also a new pattern of revolver has been introduced for the whole army, which I will refer to afterwards.

For many years I have devoted a good deal of attention to swords, in hope that I should eventually succeed in working out a really suitable weapon. It took me some years to find out that it was impossible to have one which was equally efficient for cutting and for thrusting; however, that was a great point gained; having made that discovery, I then determined to work out the problem of an efficient thrusting sword for an infantry officer; and it was whilst I was muddling over this, that I fortunately came across the following passage in the *Civil and Military Gazette* of the 29th September 1886, which I will give in full, as I consider it to be of great importance—

“The best swordsmen are agreed that, for defence, the point, and not the edge should be relied on: what seems to be required then is a fencing blade with a hilt of a shape that can be properly grasped, and a guard that will be some protection to the sword hand and forearm. It should be light enough to be used freely and rapidly as a small sword, and yet strong enough to stop a downward cut from a mounted man, or to parry a thrust with a bayonet. We have seen such a sword made to order by Messrs. Wilkinson and Co. for an infantry officer, who made excellent use of it in the days of the Mutiny. The hilt was square like a foil's and gave a sure and firm grasp; the guard of steel basket work gave good protection from point or cut; the blade, quite straight, commenced about two-thirds of the length of the sword from the guard; it was narrow, double-edged, keen, and limber. The rest of the weapon was merely a rectangular bar of very finely tempered steel, capable of stopping any downward cut, or turning (in good hands) any bayonet thrust.”

There, I said, is a clue to the sword of the future, if not the actual weapon itself; so I sent the description to Wilkinson and Co., accompanied by some remarks of my own, and the result was this sword which I now shew you, which was sent out to me sometime during the winter of 1886-87. When I went home in 1889, I found that Messrs. Wilkinson and Co. had made a duplicate of that sword for exhibition, to which I was shortly afterwards enabled to draw public attention. Beyond knowing that this sword was constantly being examined by various officials, I was unable to ascertain what was being done; and to tell you the truth, I did not think it at all likely that any thing would be done, therefore I was all the more agreeably surprised when I read in the papers a short time ago, that the War Office had ordered a new weapon for infantry officers to take the place of the sword at pre-

sent in use, which has been in use during the past 60 years. I have been unable to procure one of the new swords yet, which is unfortunate, as I should have liked to have compared it with this one that I have just shewn to you, but these illustrations from the *Daily Graphic* will help in some measure to enable us to compare the two.

For convenience I have put short descriptions of both weapons side by side. I must say that I should very much like to know the name of the writer of the article that I read to you just now, as it is to him, and to him only, that the thanks of the army are due for the new sword.

My own sword made from the description in the *Civil and Military Gazette*, dated 29th September 1886.

The new pattern sword ordered by the War Office in Army Orders 1892.

Length of grip inside
the guard 5 inches.

Length of blade... .. 32½ "

Ten inches front and six inches back of blade measured from point capable of receiving an edge. The rest of the blade back and front is merely a tapering bar of steel capable of stopping any blow or thrust.

Blade perfectly straight, the hilt rectangular so as to give a firm grip coupled with plenty of freedom for wrist play, for thrusting, and guarding. The guard is plain and strong, is capable of withstanding a cut from any weapon, does not cramp the hand or impede the motion of the wrist, and is not in the way when the sword is hooked up, or is carried in a frog close to to the body.

Only 10 inches of the edge in front from the point is sharpened, but six inches from the point at the back is likewise sharpened for cutting. The rest of the blade back and front is blunt, and rounded for parrying purposes, and has no power to cut. It is much lighter, better balanced, and much smarter in appearance than the old pattern.

It is perfectly straight and the hilt or grip is squared so as to facilitate pointing and guarding.

The handle of the new weapon appears to be too short, but we must, I think, congratulate ourselves that at last we have got an infantry sword which will do *one* thing well, in place of the old one which in the most skilful hands only, could do two things very badly. It is a regular thrusting sword, and it ought to prove a most formidable weapon, if officers are only taught to use it; but the instruction will have to be compulsory; regular fencing schools will have to be established at first in every cantonment, where the necessary apparatus will be supplied by Government, and where fencing with foils, bayonets, and a dummy imitation of a heavy cutting sword will have to be taught systematically by trained instructors supplied from the large gymnasia,

so that all may learn how to receive a cut or thrust, and then to return with the point; or how to run a man through before he has time to deliver his cut. Every officer should be made to attain to a certain fixed standard of perfection, and commanding officers must be held responsible that all under their command are proficient in the use of their weapons. I consider this to be of the utmost importance, because it is unfortunately notorious that there are very few commanding officers in our army who are expert in the use of either sword or pistol themselves, whilst some of them neither know nor care very much about such matters; therefore, unless they are forced to interest themselves in it, the work of instruction will not be carried on with the proper amount of vigour and intelligence. In course of time a race of commanding officers will come on, each one of whom will be a highly trained fighting man, the natural effect of which will be that all under them, officers and men, will be equally well trained, and the actual fighting power of our regiments will be very much increased.

It seems to me then that the first step necessary, a step which should be taken at once, is to utterly abolish everything in the way of sword exercise and stick play that is obviously now useless; to start fencing classes everywhere; and to lay down such rules, as will ensure all officers having regular instruction and regular constant practice. If that is steadily persevered in, who can doubt that before long British Officers will become renowned throughout the world as swordsmen, and will become as fond of their weapons, and as proud of their own performance with them, as their predecessors used to be?

The style and description of instruction for cavalry officers will depend upon the kind of weapon that they are to be armed with. Obviously the infantry pattern sword is quite unsuited to them. If they are to retain their present sword, then no amount of instruction of any sort or kind will be of any great use to them because the weapon itself is so very inferior. Cavalry in a fight are attackers, therefore cavalry swords must be constructed for offence, or else they are useless; as soon as a really suitable serviceable sword has been decided on for cavalry, then it will be easy to devise a system of practical instruction for officers and men, and also a dummy weapon suitable thereto.

Early in this paper I alluded to the defenceless state of our officers; and no doubt many of you can call to mind incidents which have occurred during late years, not only in India and in Afghanistan, but also in Egypt and the Cape, which fully corroborate what I say; so I will not take up your time by relating more anecdotes than are necessary to illustrate this point. One that I may mention is that of the late Colonel Barrow of the 10th Bengal Lancers, who was one of the finest officers in the service; he engaged one day in single combat with an Afghan foot soldier, was severely wounded on the bridle arm, and would probably have been killed, if a sowar had not come up to his assistance. The other is that of an infantry officer which I will give in his own words, omitting names. He wrote thus "At one period of the action I was engaged with two of the enemy (natives); I had only a light dress sword; my revolver had already been discharged" (he forgot to men-

tion the bag that he made with the revolver); my sword had been bent under the blows of their clubbed muskets" (it would be interesting to know how many blows from a clubbed musket are required to bend a "dress" sword); "and I was decidedly at a disadvantage, and was acting on the defensive. Havildar—— coming up afterwards, rushed in, and closing with one man, cut him down, thereby enabling me to cut down the other, which I did with some difficulty owing to the lightness of the sword and the fact of its being bent." You will be able to judge from that what the real value of that officer was as a fighting man and a leader. Had he been properly armed, and able to use his weapons, he would have quickly polished off his two adversaries, and passed on to more useful work.

Well, I have no hesitation in saying that there are hundreds, I might almost say thousands, of other officers who would have been similarly armed, and who would have acted in a more or less similar manner, had they been in his place, and I would ask whether it is right that leaders of our troops, on whom the success of important operations to a very large extent depends, should be allowed to go on an active service in such a disgracefully inefficient state. Is it a sign of bravery, or prudence in a man, to trust his life to such a weapon as a "dress" sword, which he does not know how to use!

It may seem curious that a new sword of an universal pattern could not have been produced for cavalry as well as for infantry. There has been much discussion on the subject of late years; but the sword makers have always said "tell us what you want your sword to do, and we will make you a weapon that will do that work," which one would think was reasonable enough, at least such is the rule in every other trade: however, that is just the question that our responsible authorities were never able to answer. They always persisted in saying that they wanted swords of certain fixed dimensions and shapes; and nothing more could be got out of them; so the sword makers made them weapons according to pattern, pocketed the money, and said nothing. Every now and then a stir was made; as for instance after the famous charge against the Mowahs near Shubkuddur, when the leading English regiment knocked down the men by blows from their swords, and the supporting regiment of Bengal Cavalry cut down the very same men as they got up again. A great fuss was made also over the breaking and bending of our cavalry swords in Egypt, but nothing useful came of it. It was proved beyond any possible doubt, that the swords were neither fit for thrusting nor for cutting, and that was held to be sufficient reason for our cavalry troopers being unable either to thrust or cut.

It will no doubt occur to some of you to wonder what was done officially by way of endeavour to remedy these serious defects. Well I will tell you what was done. There were many informal meetings of many important persons, at which a great deal of talk was got through; a specialist was consulted confidentially regarding the effect produced on the temper of a trooper's sword by having it frequently sharpened on a grindstone, but his reply was never made public, and at last the commanding officers of cavalry corps were asked, confidentially, certain

questions regarding the bending tests of swords, which I presume they answered to the best of their abilities. Some of them had the good sense to ask advice from professional sword makers, and consequently their answers were sensible; but the majority did not do so, and their answers showed what utter ignorance prevailed at that time amongst cavalry officers with reference to the swords with which their men were armed. The grand result of the whole business amounted practically to nothing; a very slight alteration was ordered in the specification, which gave a certain amount of trouble, and cost a certain amount of money, but which did not help in any way towards the production of a better sword. This came out in September 1891. The new pattern cavalry sword is now $34\frac{1}{2}$ inches long in the blade, with a tang $5\frac{3}{8}$ long over all; the limit of weight is 2 lbs. $8\frac{1}{2}$ oz. to 2 lb. $9\frac{1}{2}$ oz., a slight increase, and the bending test is 5 inches each way; the thickness of metal between the fullers has been slightly increased, and the edges of the back have been slightly rounded. But there is little doubt, I fear, that the new pattern sword will prove no better or no worse than the old one.

I do not think it would be right to jump to the conclusion that the people who draw out the specifications for swords and pistols, know less about those weapons than any one else, because they very possibly do know more *theoretically* than most of us, but I think we may safely assume that none of them have studied the subject practically either as soldiers or as manufacturers.

I have here a trooper's sword, which I hope some of you will examine and handle. You would think that nothing could break such swords, but it all depends upon how they are used; they occasionally break at military tournaments, and they frequently break on service; why is this? Well I must tell you that the chief reason for this lies in the handle, which is nearly round, and which appears to have been designed with the object of making it almost impossible for a man to cut with the edge of the sword leading; a very strong man who has had plenty of practice may do so, when he is fresh and his hands are dry; but for one who is tired and whose hands are moist, it is almost an impossibility; consequently he delivers a blow with some part of the blade other than the edge, which is a kind of treatment that the weapon was never intended for, and the result too often is that it breaks; and even when the edge is leading truly the cut will not be a really effective one, unless the blow is accompanied by a certain amount of "drawing" action, which is not taught to our troopers.

Now if you examine an ordinary *tulwar* or indeed any sword with which our native cavalry are armed, you will find that if you grip the handle firmly and use the whole length and strength of your arm, not the wrist only, you must cut with the true edge leading, and no drawing motion is required, because the edge *must* meet the object on the flant, and therefore it cuts of itself. But I ask you to notice particularly the size and the shape of the handle, or grip, which in most swords is made to fit the hand. It is a common remark that the grip is made small, because Orientals have smaller hands than Englishmen, but that is not wholly true, inasmuch as the hands of the labouring classes in India from

whom our cavalry recruits are chiefly drawn, are not I venture to think any smaller than those of Englishmen of equal stature. The real reason for a short grip is to ensure a firm tight hold which allows no play to the wrist, and so necessitates the delivery of the cut from the *shoulder* with the full weight and strength of the whole arm, *and with the whole body leaning*. No Englishman is ever taught to cut in that manner, except the few, the very few, who are specially instructed in lead and oblique cutting, but on the contrary all singlestick play, and all kinds of "exercise" teach men to use the wrist in preference to the arm and shoulder. Which description of sword is then the most suitable for cavalry officers and men for a cutting sword or a thrusting sword? That question should be decided as soon as possible. If, as I believe, the preponderance of opinion is in favour of a cutting sword, then all recruits should be armed with a weapon of such a shape that they can use it for cutting only: the blade must be broad and curved and heavy, and special care must be taken about the *shape* and size of the grip, and both officers and men must be taught how to use it properly. The hilt guard and the scabbard are minor, though not unimportant, details, which may easily be worked out afterwards. That brings me now necessarily, though somewhat reluctantly, to condemn the use of our old friend the singlestick as a weapon of instruction, for the sole reason that it only teaches tricky wrist play, and does not teach a man to deliver really effective cuts, and in this also I would strongly recommend the next weapon known as the *gibet* which Colonel Lloyd describes so well in a paper to which I have already alluded. Don't despise it because it is a product of the east, and not of the west, ask for it as a fair trial, and if it fails to teach men to cut, then try to invent something better. Call it by any name you please.

If on the other hand a thrusting sword is considered the best, then it should have a long straight blade, much longer and heavier than the new infantry pattern, such as was used by the French heavy cavalry, and used by some of our own regiments during the Peninsular war, and at Waterloo. The blade should have a broad back and a sharp point, and a very carefully made hanger. Many such weapons are to be seen in the museum of the United Service Institution in London.

The old English Light Cavalry Sword, a specimen of which has been kindly lent me by Captain Gordon for your inspection, was a far superior weapon to its successor, with which our Cavalry are now armed, but it was nearly useless for cutting. I think that a competent officer will have no use afterwards with his own opinion regarding that weapon, based on his own personal experience of it.

I should like to show you one of the new pattern swords for the gunners of Mountain Batteries which probably none of you have ever yet seen, and which I think you must regard as a most interesting and effective weapon either for attack or defence, than the altered Martini-Henry layout with which the men are now armed, if it could be used in a better manner, or for the matter of that, than any other sword now in the service. I think that with a competent officer at the hilt, it would be a most effective weapon for an Mounted Artillery, and for Cavalry to use.

purely a cutting sword. The weapon which a man carries through such a *mêlée* as a cavalry charge should be most carefully constructed, so as to be in every way suited to the work, but the handle of this sword is so made, as to render the weapon to a great extent unsuitable. The grip is too long, and is badly shaped; if you will compare it with the grip of the *tulwar*, you will see what I mean. In the handle of the foil, the French foil not the foil of the Government pattern, we have the perfection of grip for a thrusting weapon, and in that of the *tulwar* we have perfection for a purely cutting sword. Let any one ask himself the simple question, Why is it that in the Crimea, and ever since then, our cavalry have done so little execution with their swords? And then let him set to work to discover the real reason, and he will most surely find it to be that the weapons used were quite unsuited to the work that was required of them. One thing that would certainly follow the introduction of a really good sword, is that the weapon would once more assume its place of honour, its only proper place, on the man, and not be fixed up any longer on the horse as if it was a hoof-picker or a currycomb.

No amount of "tinkering" will produce a good sword, the only way is to decide first, and for ever, *what work is to be required from the weapon*, then put the matter into the hands of the professional sword cutlers of England; select the pattern or patterns that answer those requirements; and teach all ranks how to use the weapon. Without mentioning names, I may say that there is quite sufficient talent in the English sword trade to produce what will be wanted, without going abroad for it.

For my own part I should like to see all heavy regiments armed with a very long straight sword like those that I mentioned just now, and all light and medium regiments armed with a carefully hilted curved sword, officers and men being armed with weapons of the same shape.

Surely of all nations in the world we are the one that requires and receives most work from individual officers, and therefore we ought to be most careful to see that each one of them is armed with the very best weapons procurable, and also that he is thoroughly well trained in the use of them. And yet strange to say, we are the only civilised nation that, until now, has absolutely paid little or no attention to the matter; and boasting the while of being the most practical nation in the world!

Of late years the French have devoted a good deal of attention to the arming and the fighting education of their officers; and the new sword which was introduced a year ago is reported to be a most excellent weapon, but I was unable to procure one of them before leaving home. The swords of the German officers are also extremely good; the last change made in them has been the introduction of a shrill whistle into the pommel, which however I would not recommend being introduced into our service.

I have purposely refrained from inflicting on you more than I could help regarding the theory of fencing, because in the first place you can, and should, read all about it in the splendid works by those great

masters, Castle and Hutton, or in the smaller books written by Mr. H. A. Colmore Dunn, Allanson Winn, and Phillips Wooley of the Inns of Court School of Arms ; and I know nothing more than what I have been able to learn from them ; and in the second place, because I want all of you to come and learn practically for yourselves. One hour every morning spent in learning and practising the art of self-defence, either with gloves, foils, sticks, swords, or bayonets will do you an incalculable amount of good in every conceivable way.

We have here in Simla a very small school-of-arms, where some of us try to improve our very limited knowledge of the art of self-defence, and where for the modest sum of Rs. 25, any one can receive the best instruction that is procurable in India ; but I regret to say that the attendance is very small. Of the two classes of officers who frequent this place, one say that they have too much office work, and therefore cannot find time ; and the others say that they are here on leave and therefore do not intend to do any work. I can sympathise to a certain extent with the workers, but not with the others.

There is yet another class of officers of whom I have made no mention, the native officers of native infantry regiments. Is it, or is it not necessary, that they should be properly armed, and that they should be properly instructed in the use of their weapons ? I am not an advocate for cramming such men with a quantity of theoretical book learning, and I would on no account exact more from them in that line than we do at present ; but I am very strongly of opinion that they should be better armed, and should receive more instruction in the use of their weapons.

As the case stands now, every native officer in nearly all infantry regiments is armed with an English pattern sword, which he has to purchase himself, and he is provided with a Government revolver at the expense of the State. He is taught that useless performance known as the infantry sword exercise, and he is allowed 30 revolver cartridges annually, of which 6 have to be fired before the inspecting general.

His parade sword is perfectly useless to him as a fighting weapon ; and the instruction and practice that he receives in the use of his pistol is quite insufficient. I would therefore venture to recommend that each one of them be provided with a thoroughly good curved fighting sword at the expense of the State ; and that his supply of revolver ammunition should be doubled. There is no use in giving any man a revolver or a sword unless he is able to make good use of them.

It might not be out of place to say a word here on behalf of the warrant officers of British infantry regiments who are in much the same plight, and who, in these days of short service and boy soldiers, are simply invaluable.

I think that here say a few special words are necessary about those hard working, and most deserving men, the instructors.

In the first place we have far too few of them, and therefore their numbers should be increased as soon as possible. I venture to think that there should be one efficient instructor for each cantonment in India, where more than one regiment of cavalry or infantry, British or

ative, is quartered ; and that places with smaller garrisons should be grouped for purposes of instruction, so that they may receive the services of a qualified man during a fixed number of months every year. In Great Britain every garrison town and standing camp should have a proper proportion of instructors. I also think that all such men should rank as Warrant officers with increased allowances.

In the next place it seems doubtful if the *system* of instruction is as good as it ought to be. I have taken the opinions of many competent men regarding our system of Army Fencing, and it seems to be generally agreed that it is too coarse and unscientific altogether, and that many great improvements are necessary, if our officers and warrant officers are to be made really good swordsmen.

At the Military Tournament in London in 1891, a few of the crack regimental instructors were pitted against the two French *maitres d'armes* who went over from France to exhibit their skill with the foil, but the Englishmen had no chance whatever ; and moreover, I am well aware of the fact that whenever army instructors compete at private gymnasia, or at public meetings in England, they are generally beaten by civilians, which is not, of course, their fault ; but it does not seem to me to be right that such should be the case. Therefore I think that what we want is a national school of arms in England for the whole kingdom, to be raised and presided over by the best men of the day, for the institution and development of a regular scientific system of instruction in swordsmanship for navy, army, and civilians alike.

The Head-Quarters of this school might advantageously be formed at the Inns of Court school-of-arms ; and branches should be established for the navy and army at such places as Aldershot, Portsmouth, the Barragh, &c. in England, and also at three selected places in India ; and a gymnasium, and regimental instructors should be passed through one or other of those schools before being considered qualified. This would take some years to establish ; but the first move should undoubtedly be made by the army, and they will find plenty of good men outside the regular army, who will be only too glad to assist. The first step is the only difficult one, for when once the scheme is started fairly, on proper lines as a National Institution and by *recognised authorities*, it will be caught up everywhere, and will be worked out thoroughly ; and we shall never again hear of British officers who are unable to use their weapons.

Now for a few words regarding pistols. Many of you have doubtless read that most valuable paper on "Revolvers and their use" by Colonel Mitcheener, but I am quite certain that there are also a great many who never heard of it ; therefore I strongly advise all such to study it most carefully, as it is by far the best paper on the subject that has ever been written. It is to be found in the Journal of the Royal United Service Institution, Vol. XXX, No. CXXXVI of 1886.

I have here a few different patterns of pistols which I hope you will examine afterwards.

The last pattern of single-barrelled Government pistol with a barrel 19 inches long, rifled and sighted to 300 yards, and carrying an Enfield

bullet, was no doubt considered a most formidable weapon in its time, 1857, and it is quite certain that a bullet from one of those pistols would stop any man, no matter where it hit him.

Here we have a long Colt, with single action and solid frame, calibre .45, a good honest weapon, which shoots best with its own ammunition, 250 grains of lead and 40 grains of powder, but it also takes all three marks of our Government cartridge. It is nicely sighted, but its great advantage over most English models lies in the shape of its handle, which enables you to fire any number of rounds without causing a jar to the hand. The chief objection to it is that it is non-extracting. The Colt may be considered the Father of Revolvers.

Before it passes away for ever I should like you to take one last look at the (old) regulation Enfield revolver, which, I think there can be no doubt, is about the very worst revolver in the world: it would have been a very bad weapon even with suitable ammunition; but with a .476 bullet weighing 265 grains having to be forced by 18 grains of powder, first through a .460 chamber, and then through a .450 barrel, such a strain was brought on the whole pistol, and such a jar was caused to the hand, that it was difficult to make good shooting; besides which, the fact of it being sighted for 50 yards made it difficult to know where to aim. Who would ever think of opening fire with a pistol at a distance of 50 yards!

After such a failure it was wisely decided that no more revolvers should be made by Government, so the contract for a new pistol was given to Messrs. Webley & Co. As a matter of course the firm was hampered in every possible way by "specifications," and by constant changes in those specifications, but at last they succeeded in producing the service revolver Mark I., which, as far as one can judge without actual trial, appears to be a much more satisfactory weapon than the last one. The length of barrel is 4 inches, the bore is .441. The bullet is .455 in diameter, weighs 265 grains, and is propelled by 18 grains of powder, being identical with the old Enfield cartridge, mark II. Hundreds of these new revolvers have been in the country for some time, but no ammunition has been supplied for them yet; and they will not take the Enfield cartridge mark III; therefore they are lying useless in the arsenals. They are so made, that they will not take the American cartridge. There are many points about this revolver which are worthy of your notice.

I will not trouble you with describing the many different kinds of revolvers that there are in the market, but I should like to bring to the notice of all those who care about pistol shooting, a most beautiful weapon made by Webley, which for accuracy and general handiness is superior to any other that I know of; this model has been lent me by Major H. Simpson, commanding No. 1 Mountain Battery, and is specially recommended by him for the use of Mountain Battery officers.

Now that I have shewn you the new pattern regulation revolver, I should like to say a few words about revolver shooting generally.

In the first place I think that it receives far too little attention in our army. Formerly no attention was paid to it whatever; and it is only of late years that a revolver has been recognised in India as [part]

of an officer's equipment, but even now there is not, so far as I know, any strict rule defining exactly what kind of revolver it should be. I venture to think that such a rule is necessary, so as to ensure no officer going on service with a weapon that will not take the Government cartridge, which is the only kind obtainable in the field.

I am afraid that I do not think the new revolver is quite good enough for the work that is required of it, which I take it is to be able to stop a man at 5 yards distance, no matter where he is hit; and I do not believe that any conical bullet .455 in diameter will do that unless it is driven by a much heavier charge of powder. If you can be always certain of hitting your adversary in a vital spot, it will be all right, but if you hit him anywhere else you will not stop him; the truth of this has been proved over and over again. Some American revolvers take 37½ grains of powder, and others take 40 grains, whilst the Russian army pistol, the Smith and Wesson, takes 27 grains, and, moreover, Messrs. Webley & Co., have for some time had a revolver which fires the American cartridge perfectly. So you see there is no difficulty in making such weapons. I should feel inclined to put the extreme "stopping" range of a revolver at 25 yards, therefore I cannot see that there is any necessity for having the barrel rifled, nor for having it sighted for 50 yards; I would therefore recommend that the service revolver should be smooth bored, firing a spherical bullet of increased diameter with a heavy charge of powder. You will notice that the handle of the new pistol still has a shoulder or hump on it which is objectionable, and the shape of the handle is not so comfortable for the hand as is that of the Colt. However, the weapon will doubtless prove a good one, in good hands, and we must make the best of it, until we can get another.

In order to become a good shot, and to have thorough confidence in a pistol, a man must have constant practice; but what practice do our officers have? Twenty-four shots every year, followed sometimes by six shots before the General, and for all which they have to pay themselves. I am not disclosing any important State secret, when I tell you that His Excellency the Commander-in-Chief has recommended that such ammunition shall in future be supplied free of cost; but is that quantity sufficient to produce good shots? I know well that it is not, and I feel sure that even double that quantity will not suffice for some men.

I venture to think that a very high standard of efficiency in revolver shooting should be exacted from every officer, and in order to attain to that, I would recommend that at least 60 rounds be fired by each one, and that all who are unable to score a certain fixed number of points, be made to fire 60 more rounds at their own expense, and so on again and again, until they qualify.

Third class rifle shots are treated in that way rightly, therefore why should officers be exempt? That should be done with the right hand *first*, but after a man has once qualified with that hand, I think that in future he should always be made to shoot with the left; because that is the hand that he would most probably use at close quarters in action.

A certain fixed number of rounds should always be fired against time, so as to make the hand and eye work together, and to accustom men to rapid firing : care being taken that rapidity is combined with accuracy.

In action, the object fired at is a man, therefore in practice the target should also resemble a man ; and points should be given for all hits on certain vital parts, excluding the head, which should count for nothing, because it is undesirable to encourage high shooting.

Much trouble is taken, and much money is spent, in teaching the rank and file of the army to shoot with rifles ; and I think that a certain amount of trouble should also be taken to ensure all officers and men, who are armed with revolvers, being good shots also. I cannot see what use there is in neglecting revolver shooting.

Native officers should, I think, go through the same course as British officers ; and I see no reason why all others who are armed with revolvers should not do so also.

I would not go so far as to advocate the adoption of "figures of merit", or of prizes for British officers ; but I would strongly recommend prizes being given to all others.

In India there can be no danger or difficulty in having revolver ranges in the vicinity of regimental orderly rooms, which would cost very little to construct and to keep in repair, and where the officers could practise without inconvenience to themselves. For bad shots, or for those who cannot conveniently get a range for shooting, I know of nothing better, in the way of practice, than snapping with empty cartridge cases in the chambers, as it teaches you to aim steadily, and to pull the trigger without jerking or flinching. I have known many men who considerably improved their shooting in that way.

In my own regiment we have a revolver range near to the orderly room which is open for practice every Saturday morning ; and it is rare for a week to pass without one or more officers going there to fire a few shots.

I do not suppose that there are any Englishmen who take a pride in being either bad shots, or bad swordsmen, though I have met some who were not ashamed of their want of skill ; but I do earnestly hope that before very long, there will be none anywhere who do not take a pride in being good at both.

The women of England have at all times encouraged all sorts of manly exercises, and they do so now to the utmost of their power and ability ; therefore I can appeal to them with confidence to allow swordsmanship and skill with all arms to be again considered to be entitled to the first place amongst such exercises, to take precedence even of Lawn Tennis. I feel quite sure that if any woman could only realise the danger, the needless danger, which her husband, or her brother incurred by not knowing how to use his weapons, she would make him learn the use of them quick enough. It is not necessary to search far, for instances to shew the necessity for a certain amount of skill ; look at Sikkim, look at Kandahar, look at Quetta quite recently, and at other places, where officers were either maimed for life or killed outright owing

to not being expert in the use of their weapons, and mark you, these cases did not all occur in pitched battles, or in fighting against great odds; quite the reverse.

I am well aware that there are many who disagree with me, in a greater or lesser degree, in most of my ideas about officers and their weapons, and that is only as it should be. It pleases me to know this, because there is nothing like opposition, if a subject is to be thoroughly investigated, and I hope very much that some of those who hold opposite views to me, the more the better, are here to-day, and that they will favour us with their opinions without any reserve, in order that the whole question may be thoroughly threshed out and settled.

I am not posing here as either a professor of the art of military self-defence, or as an authority on that subject; but it is one which I venture to think is of considerable importance to us as a nation; and that must be my excuse for presuming to address you to day.

I am painfully conscious of my own inability to put the case before you, as it ought to be put, but I have done my best; and I now leave it to you to decide whether my ideas are right, and worthy of support; or whether they are to be condemned as being wrong and worthless.

The Bombay branch of the Army and Navy Stores are getting out some of the new swords.

Manton & Co., of Calcutta, are Agents for Webley.

Major-General G. E. L. S. SANFORD, C. B., C. S. I., R. E. : I have long been interested in the subject on which Colonel King-Harman has lectured to-day. About the time to which he has referred, that is to say about 1885, I got Messrs. Wilkinson to make me a sword, which is remarkably like that shewn by the lecturer, and likely to be adopted for infantry officers. This sword was made to my own design, except in some minor details which Messrs. Wilkinson adapted from recent experiences in Egypt. I need not to say the sword I wanted and obtained most satisfactorily from this great firm, was one suited to my personal requirements as an officer, who might be driven into a corner while on foot, and who also needed a weapon which might be carried without any encumbrance or interference with the ordinary duties of an Engineer officer. I am not a tall man, and though no swordsman, am far more at home with the foil than with the singlestick. Accordingly my sword is a thrusting one. It is only 33 inches blade. From the point for about 20 inches it is a thin double-edged blade, thence to the hilt it is wider and heavier. The handle is as nearly as possible of the type of a foil handle with a heavy pommel. It is more rectangular than oval in section, and the grip itself, instead of being of fish skin and brass wire, is made of wood exactly like a surgeon's knife. The hilt is not quite what I wanted, it is of plain steel, and a little heavy. I should have preferred a mere shell and single bar. It has the great advantage of being able to turn down the inner edge of the shell, without which no sword can be carried in a Sam Browne belt without inconvenience.

I add as a remark of more general application, that though I suppose it is necessary for the rank and file of the army to carry the same pattern of sword in their classes, in order to simplify manufacture and issue, and though as regards pistols it is absolutely necessary that all shall use the service ammunition; yet as far as officers are concerned, whatever pattern of sword they may have to wear on parade for the sake of uniform appearance, it has always struck me that very great latitude should be allowed them in respect of weapons for actual service, upon which their lives may depend. For I do not believe that among any ten or twelve officers all will be equally suited with the same weapon.

My own sword to which I have referred has provoked much remark, and has been considered perhaps rather a lunacy at camps of exercise.

THE CHAIRMAN: I regret that there should not have been more discussion on this paper, as there must be many officers present who have ideas of their own on the subject, and personal experience, which would be of value to others. I will only say a few words in closing the discussion. Since Colonel King-Harman's lecture was announced I have read a letter, written by my uncle from the field of Salamanca, the day after the battle, to my grand-parents, describing my father's wounds. As regards his own share in the battle my uncle writes.—"I fought with my Portuguese regiment which behaved well, and bayoneted a column of the enemy. You will scarcely believe how I could have escaped, when I assure you I was cutting my way in a solid column with my common regulation sword. But Providence protected me as it did at Badajoz." I am one of those who believe that Providence protects those who protect themselves, and I happen to know that my uncle was a most excellent swordsman, which I have no doubt was one chief cause of his escaping in the midst of many dangers. I may relate to you an early experience of my own as to the advantages of good swordsmanship. In the first action in which I was ever engaged, in the Indian Mutiny, some of the enemy's cavalry charged down upon the guns. Our Brigadier-General of artillery, with the characteristic bravery of an English officer, drew his sword and went to the front between two guns to encounter one of the enemy. In a moment his sword arm was dangling by his side, so severely wounded, that it had to be amputated the same day. When I asked him afterwards how it happened, he said "I scarcely know, I am no swordsman, and his *tulwar* like a flash of lightning severed my arm at the elbow." Contrast with this the success of a Major of the 12th Lancers, who on the same occasion in the presence of his men, himself unwounded, passed his sword through nine of the enemy, a feat which was the subject of conversation in our small force for many days.

Colonel King-Harman has divided his subject into the two heads, the weapon and the knowledge of how to use it. I scarcely know which is the more important. As regards both the sword and pistol, it is satisfactory to know that improved weapons have been introduced into the

army. As regards their use, it is I think impossible to overrate the importance to the individual officer of good swordsmanship and correct shooting. If I were to advocate duelling I should probably be looked upon as a heretic. But it is impossible not to admit, that in countries where duelling still exists, there is a direct incentive to the officer to become an expert in the use of both sword and pistol. When I was appointed military attaché at Paris I was greatly struck with the immense superiority of French officers to our own in both these respects, and I felt my own ignorance to be such a serious matter, that I took lessons both in fencing and in shooting, and though I dare say I never became very expert in either, still such knowledge as I acquired added greatly to my confidence. There must be few of us who have seen active service, who cannot recall to our minds instances in which their expertness in the use of the sword or pistol has saved the lives of officers whose death would have been a great loss to the State. If officers are to be induced to pay more attention to the use of their arms it is necessary that they should have before them a powerful motive, and I think that motive is to be found, not only in their own increased safety, but also in their increased value to the country and the army.

It is to be hoped that Colonel King-Harman's lecture may be widely circulated among our officers, and may call these motives to their mind. And if His Excellency the Commander-in-Chief agrees in thinking the subject of sufficient importance, I am sure that a few words from him on the occasion of inspections would carry great weight. As regards the Government of India, I am sure it will do its best to provide sufficient ammunition to enable officers to become good shots. But as regards Colonel King-Harman's proposal to give their swords to all officers, and other proposals involving considerable expenditure, I can only, that when the Simla Currency Association has raised the value of the rupee to two shillings, I am sure the Government of India will give them their best consideration.

It only remains for me to ask you to join me in giving a hearty vote of thanks to Colonel King-Harman for one of the best, most interesting, and most amusing papers which has ever been read in the lecture theatre of this Institution.

SWORD MAKING.

From "Pictoria! World" of November 13th 1884.

A few months since several of our contemporaries drew attention to the quality of the swords and bayonets supplied to the British army, the question being provoked by the lamentable manner in which so many of these weapons failed during the recent Egyptian campaign. Now that another expedition has been organised against the Soudanese, the quality of whose swords we were told is so superior to our own, we introduce into our present number some sketches illustrative of the manufacture of the sword, at the factory of the well-known firm of Messrs.

Wilkinson & Son of Pall Mall, where it is made at least equal (and we think in the opinion of most officers of the British army, superior) not only to those wielded by our dusky Egyptian foes, but to any of present or past Eastern or European make.

As a weapon the antiquity of the sword is well known, and its employment by every nation engaged in warfare rendered it a subject of much greater importance formerly, if we may judge by the general indifference now manifested as to its quality.

It is extremely probable that wooden swords were in use long before the working of metals was understood, the transition from a club or branch of a tree to a piece of wood fashioned with a cutting edge being easy, and naturally suggesting itself to the minds of savages. One thing, however, is certain: in former times swords were so highly prized as to be kept in temples, and bequeathed in the wills of princes and warriors. It is well known that Damascus was formerly celebrated all over the world for its sword blades, but the manufacture of genuine Damascus blades has declined, although there are many imitations. As to the jowher, or water, of the genuine Damascus blade, this is attributable to the nature of the iron ore used, and method of converting it into steel. The late Mr. Henry Wilkinson went thoroughly into the question, and obtained specimens of Indian wootz, or cake steel, and proved, by making blades from it, that the figure so sought after existed in the steel itself, and to be developed required only the action of light and kussess.

In Messrs. Wilkinson's factory the sword of the present day is produced in the best possible manner, and nothing is omitted that will insure its being turned out in the highest state of perfection.

In describing the process we divide it under three heads: blade, hilt, and scabbard.

THE BLADE.—The steel from which this is made is manufactured expressly into moulds, each mould being sufficient for two blades. One of these is taken to the anvil and cut in half "cold," and if, on examination, the fracture proves satisfactory, the blade is forged out into the requisite form. In this process it is necessary to subject the blade to from twenty to thirty heats, the utmost care being observed to avoid the possibility of overheating or burning the steel, as should this occur but once, the blade will be "a waste." The blade being thus forged is heated to a bright red and hardened in a large tank of water, to which certain chemical ingredients have been added; this also is a most important process, and is kept secret in the firm.

The blade having been tempered, straightened, examined, and roughly tested, is ready for grinding, by which the surfaces, edges, and grooves are trued up on stones six feet in diameter and weighing about one and a half tons. The blade is next placed in the hands of the viewer for proof, by an Eprouvette of Messrs. Wilkinson's invention. This machine has a movable arm or socket, in which a blade is placed and wielded with any desired power. The blade is fixed in the machine, and the sides are alternately struck upon a plane iron surface with force equivalent to a blow of 200lbs. to 150lbs. This test being satisfactorily

passed, a block of oak is placed on the iron table and the blade is brought down upon it upon edge and back at the centre of percussion with a blow of from 400lbs. to 500lbs. But this is not all: the blade is next submitted to the bending proof, in which it is bent until shortened one-third of its length, that being the maximum amount of spring it should possess, and, finally, the point is thrust through a sheet of steel of the thickness of a cuirass. A blade which passes through all these tests without the slightest defect being made apparent (and as a matter of fact only about 50 per cent. do pass through the ordeal), is considered fit for any fair work which it is ever likely to encounter on service, and is numbered and passed on to the polisher, who, by means of wheels and bobs of different shapes dressed with emery and crocus, prepares the surface, and gradually produces upon it the brilliant black polish known as colour.

The ornamenting of the blade is performed in various ways, but the one most generally adopted is that known as embossing. The design is drawn upon the polished blade with stopping, the fine lines intended to represent shading or engraving being etched out with a needle, all those parts intended to remain bright being covered with the stopping. When this has set hard and dry the blade is dipped in an acid bath which destroys the polish, and when the stopping is cleaned off, the pattern drawn is left perfectly bright, and the ground a dead grey. The blade is now finished, and only requires to be fitted to the hilt and scabbard.

THE HILT.—This is made to various patterns and designs, but is broadly divided into those made of gilding metal, for infantry, engineers, and naval, and those of steel for cavalry, artillery, rifles, Highland regiments, and the Foot Guards. Gilding metal is used only for those hilts that have afterwards to be gilt, and excepting only in one or two minor details, these pass through the same stages of preparation as others made of steel; cutting out the blanks from sheets piercing the pattern, shaping the guard, filing, chasing, engraving, and polishing. The grip is made of wood covered with fish skin, and bound round with gold or silver wire.

THE SCABBARD.—This is made either from steel, brass, or leather. When of brass or steel a piece of the requisite size is cut from a large sheet, roughly shaped into a flattened tube, the edges brought carefully together and brazed. The tube is then put upon a mandril, and hammered into shape, the small end filed down and the shoe and rings affixed. After this it is filed over the surface, the shaped mouthpiece and lining fitted, and finally the whole polished.

THE HIGHER TRAINING OF INFANTRY NATIVE OFFICERS.

By J. McD. B.

"Tis not in mortals to command success."

"But we'll do more, Sempronius, we'll deserve it."

Any officer who has undergone the experience, knows what an utter stranger he is for a long time, to the men of a (native) regiment, should he first join it on the eve of a campaign. Colonel Young truly says, that for fighting against Europeans, the British officers must "be part and parcel" of the organization, not addenda to it.*

1.—We have to deal then with the present, with a material matter affecting the fighting power of the native army. The training of the infantry native officer claims our attention first and foremost. On his efficiency must depend the intelligent direction of a battle, of its successful issue perchance.

2.—Colonel Young has shown that occasions may occur, when all the British officers of a native infantry regiment will be placed *hors de combat*.

Many instances of terrible losses among officers can be quoted in support of this contention; these, however, occurred in the days of deep formations, at Gravelotte as at Chillianwallah. We may safely indulge a hope that in the dispersed formations now employed, at least one or more British officers will survive the general destruction, one or two, who may be spared to pilot their battalions to victory, as far as the distractions of a modern battle-field permit of individual guidance.

But there is nothing so probable as the improbable. Battalions may be deprived entirely of British officers, or as is more likely, these officers, from the paucity of their numbers, and from stress of circumstances, will be powerless to influence the action of their subordinates.

These, the company officers, will be frequently thrown on their own resources, and be called upon to exercise their own discretion in an emergency.

3.—Does the system of training in vogue tend to prepare the native officer for this contingency?

Inconsistency of the existing system of training. Most decidedly not. Every shred of individuality is denied him. Until self-dependence is recognised, inculcated, and encouraged, we most assuredly court disaster.

* U. S. Institution of India Journal No. 88 p. 301.

4.—Borrowing a text for our discourse from Colonel Young,

"I maintain that we have at present at the same time too few British officers and too many; too few for entirely British leading, too many for giving any scope to the native officer. . . . the two at present are counteracting each other."*

We see here the root of the existing evil, the antagonism of the British and Native officer. Let us briefly illustrate this from the drill and manœuvres of a battalion.

At "company drill" for instance, we often see a young wing officer fresh from his British regiment, neutralising or in other words suppressing, the intelligence of some extremely able Native officer, who could give him many wrinkles in the exercises under execution.

Again, in "the attack," we find this young officer with the firing line, attempting to control the advance, direction and concentration of fire, the estimation of distance, and so forth, matters beyond individual supervision in the bewildering exigencies of the actual battle-field.

This interference, and unwise assumption of command is conspicuous throughout the entire training of the sepoy. The wonder is, that the native officer does not fail altogether in the hour of need. And yet, many instances might be cited from the records of our small campaigns, in which the native officer has borne himself intelligently, and with credit to his regiment. Colonel (now Brigadier-General) Lance, in a note to Colonel Young's lecture, quoted several instances within his own experience.

5.—In a lecture recently delivered at Berlin, Major Keim says:—"If

The training all important for infantry—a war training. a commander exhibits a tendency to train his men up to the standard of the parade-ground, rather than to that inspired by the exigencies of battle, he must be regarded as simply failing in his principal duty, that is, imparting a warlike training.†

That this misdirection of training has to be guarded against in the British army is testified to by Colonel Tulloch in a recent lecture.‡

"Few commanding officers", he says, "consider it their duty to do more than will enable their regiments to pass a creditable annual inspection."||

In India, the concentration of infantry for manœuvres every cold weather, checks this tendency to a certain extent. It must be borne in mind, however, that a smattering of the most important section in battle training, the attack, is easily acquired, and it requires but occasional practice to maintain a tolerable standard of efficiency.

The fundamental basis of success in war is a thorough acquaintance with, a complete mastery in fact, of the simple formations now generally adopted, in order that they may be instinctively and readily

* U. S. Institution of India Journal No. 88, p. 301.

† R. U. S. Institution Journal No. 152. "Present state of Tactical science."

‡ R. U. S. Institution Journal No. 149 p. 769.

R. U. S. Institution Journal No. 149 p. 769.

applied to varying circumstances. This familiarity can only be acquired by continual practice, and this axiom is generally acknowledged in Continental armies.

6.—We may allow then, that continuous training is required to fit

Higher efficiency required of the European armies for the requirements of the battle-field. These armies are composed of men, each of whom is taught to think for himself, so as to act for himself when occasion requires.*

Clearly then, we must devote more time than we now do to *practical* battle-training. If one day a week is devoted to practice in attack and defence in a European battalion, two or three days a week in a native regiment should be set apart for the same exercises to familiarise the less intelligent native with them.

Greater efficiency alone can atone for the lack of self-dependence in the native army, and the principal factor of increased efficiency is the higher and more complete training of the native officer.

7.—Assuming that a more efficient preparation of native infantry

The company is the fighting unit. for the practical requirements of the battle-field must be insisted upon, we recognise the native officer as the pupil to whom we must devote most attention.

The army order, introductory to "infantry drill 1889," tells us that "the careful training of the soldier in ordinary times *by those whose duty it will be to direct his fire and lead him in action* has become of paramount importance." The italics are mine.

The German infantry drill regulations are more in accord than our own with the latest accepted tactical ideas. In these we read that:—

"The direction of the fight in the fighting line rests with the companies," and, "the whole system of fighting is based on the co-operation of the several companies with one another in the various phases of the fight."

Intelligent leading and co-operation are the keynotes of these instructions, and perfect familiarity in their practical application is the standard to which we must aspire.

In our companies, we have a handy tactical unit, of a strength of from 70 to 80 sepoys, and in this respect, our native company commander has an easier task in hand than the Continental captain, who is expected to intelligently handle more than double that number. And this he may frequently be unable to do. For example, during the battle of Vionville, the companies of the 2-3rd Brandenburg regiment (and those of other battalions no doubt), dissolved into disconnected *züge*,† each *zug* being in number about equal to our existing company.

* This particularly applies to the German army. The attacks on Plevna show the Russian soldier to be too blindly obedient.

† Précis of the regimental history of the 3rd Brandenburg infantry regiment. R. U. S. I. Journal No. 163 p. 972.

8.—The strides made in armament and material do not, after all, greatly increase the difficulties of “leading” and direction. Smokeless powder, indeed, confers positive advantages. Increased facilities for fire-discipline and control, and increased facilities for commanders of units in combining their action with that of adjacent units have been claimed for it.*

Another point which favours judicious “leading,” is the continual simplification of drill and manœuvre. Intimate acquaintance, acquired by frequent practice in the normal system† of attack and defence will teach a native officer to act as directed to do in peacetime.

“It is a recognised fact that men who are in ordinary times taught and frequently practised to act in a particular manner, will, from acquired habit, under somewhat similar conditions, do the same in moments of great mental strain, and will, even under heavy fire, act, as it were instinctively, according to well established custom.”‡

“Rejuvenated linear tactics,” advocated by Colonel Hallen in the “Summer Night’s Dream,” and more recently supported by the results of the Swiss artillery practice in 1890,|| would also materially lessen the difficulties of leadership.

The spirit with which every company leader must be imbued is simply this: that when once launched against an enemy, he must push on, and on, and on; that halting will be fatal; that a half-hearted advance, or retirement¶ will be more costly than a vigorous attack; that he should do his utmost to keep his men as cool as possible, in order that they may deliver, to the last possible moment, that accurate and efficient fire which wins the battle.

9.—Let us now embody the foregoing generalities in a few practical suggestions.

Interference with the independence of the native officer deprecated.

We have seen that any intelligence and ability a native officer may possess is counteracted and extinguished by the continual interference of the British officer. Forbid all direct intervention, and the native officer, unless he is utterly incapable, will develop latent qualities of self-dependence hitherto unsuspected.

Take the company. During the annual “military training,” the native officer, under the eye of his wing commander, enjoys an amount of latitude, which is denied him throughout the remainder of the year. Many officers will have remarked the intelligence displayed by the company commander, when his company is pitted against another at

* R. U. S. Institution Journal No. 158, p. 407.

† The probable abandonment of a normal system of attack, in the forthcoming revised edition of “infantry drill,” will no doubt, be amply compensated for in India, by the adoption of some elastic system adapted to the changed conditions of war, and equally suited to the characteristics of our native infantry.

‡ “Infantry Drill 1889” Part VI., p. 205.

|| R. U. S. Institution Journal No. 156, p. 160 and *Seq.*

¶ As at Majuba.

the close of the "military training." But three weeks training will not fit the company for the requirements of an European battle-field. It must be exercised *weekly* by its own native officers, under the *supervision* of a British officer. The training of companies should frequently be carried out in co-operation with, and against, other companies. This will discover and improve the inherent intelligence of some native officers, or will lay bare and confirm the incapacity of others, who should be got rid of.

10.—The British officer, at the outset of each day's instruction,

The suggested training.

and on the manœuvring ground, should set his native officers a simple scheme to execute. Let him point out the peculiarities of the ground, and the general manner in which the operations are to be conducted, and then, he should hold his peace. At the conclusion of the exercise, he can point out mistakes, and offer a few critical remarks to the assembled native officers and non-commissioned officers. It is almost needless to add, that the exercises can be varied, and modified when in course of execution, to accustom the native officer to cope successfully with the fluctuating phases of a fight.

In passing, it may be suggested that the native officers, as well as the rank and file, need not be impressed greatly with the advantage of cover in the later stages of an action. The best troops have been known to unnecessarily avail themselves of it at critical moments, to the detriment of success. The simulation of casualties also sows the seeds of skulking and cowardice, and might well be abandoned.

11.—The wing commander, anxious to direct and control everything

Wing officers should supervise the training of companies.

in his wing, is almost overworked at present; on the other hand, the wing officer has an easy time comparatively. He is allowed to interfere very little in the practical training of the wing, and, however keen he may be on his profession, is obliged to possess his soul in patience until he becomes adjutant or wing commander. The words of Sir Charles Napier apply particularly to the wing officer.

"Young men, on joining their regiments, have all temptations in the world to pleasure, none to study; and they some day find themselves compromised on service from want of knowledge not of talent."

When the wing commander is engaged at musketry, or in "military training," the wing officers attached to his wing might be profitably employed in supervising the training of the available companies as suggested. The officer commanding could see that they do not hamper the native officers by undue interference with their independence of action.

The young officer possesses a good knowledge of tactics on joining the staff corps. He has probably been accustomed to lecture to his company in a British regiment, yet, on appointment to a native regiment, this tactical knowledge is often allowed to rust, until impending promotion necessitates further study.

The supervision of the practical training of companies would constrain these officers to keep minor tactics green in their memories. The system would have the further merit of familiarising the wing officer

with the several companies of his wing. Under the present system, he has usually but a slight acquaintance with them. He would thus be better fitted to lead men whom he knows, if the native should fail in the hour of need. As likely as not, the best of our fighting classes will refuse to follow a British officer who is practically a stranger to them.

12.—As in the company, so with the battalion. The British officers

Limitation of intervention with the native officer in battalion drill and manœuvre. can exercise their vigilance as “battle police,” to borrow an expression from Colonel Hallen; assisting the commanding officer in the detection of errors to be subsequently rectified.

In the actual fight, the British officer will certainly have ample scope for the judicious exercise of his ability. A careful musketry training, intelligently applied on the drill-ground, will obviate the necessity of intervention in the details of fire-discipline in action. It is sometimes to be noticed that these important matters are neglected at drill, and that the fire-discipline taught on the rifle range, is dissociated from the fire-discipline required on the battle-field. The remedy for this has already been suggested. His Excellency the Commander-in-Chief recently advised, that every parade-ground movement should be associated with the concentration of fire on some particular object at the completion of the manœuvre. If this advice was persistently acted upon at every “steady-drill” parade, we would see less confusion displayed in the excitement of battle.

13.—In the preceding paragraphs, we have contended that the average native officer, properly trained, is quite capable of leading his men on an European battle-field; we have maintained, that whether he is fitted for the task or not, he will probably find himself in situations, when failure, due to unaccustomed responsibility alone, must seriously compromise his battalion, his brigade, his division, his army perhaps.

But we cannot educate duffers up to the standard we require. Native officers can no longer be selected in haphazard fashion. They must be picked men, the pick of the non-commissioned officers,

Improvement of the class of native officer considered. who in their turn must be the flower of the sepoy ranks. Associated hand in hand with higher training is the improvement of the class of native officers. Let us glance at the native officer as he now is.

14.—There are native officers who have attained their position indirectly for gallantry in the field, or for similar recommendations, and many of these are distinguished more by their dash than by their professional ability. To improve the knowledge of such men as these would seem at first sight a bootless labour. But skill in war, as skill in any other profession or trade, is only acquired by perfection in its rudiments. In most, probably in all native regiments, the native officer, as a rule, is well acquainted with his drill. Continual repetition polishes up even the most ignorant. In battle-training (extended order drill in short), owing to circumstances to which we have before alluded, the native officer does not get practice sufficient to make him as perfect a master of detail as he should and might be.

15.—Then, there are others, who from apathy, age, incapacity, attainment of the limit of their ambition, want of *esprit-de-corps*, and what not, are hopelessly unfitted for the positions they hold. One sees many instances of men good as non-commissioned officers, and yet utter failures in the commissioned ranks. This points to the necessity of a period of probation being fixed in the interests of the regiment, however distasteful it may be to the individual concerned. These good-for-nothings should be summarily ejected. Sentiment should not influence their retention in the service, especially when a liberal pension (to them) awaits them in retirement, after the qualifying period in the commissioned rank. Many a jemadar is allowed to remain in that grade when he is totally unfitted to command a company. This is not as it should be.

16.—There is yet another class of native officer. He, who, from his natural intelligence, can be safely entrusted with increased responsibility. As before suggested, his genius should be carefully sought after in the non-commissioned grades and pushed on. We do not refer to the over-educated individual, who is often to be shunned. It is generally allowed, that education after European methods does not agree altogether with the good qualities of our fighting classes. No, the men alluded to are probably to be found in every regiment. To get such men we must go to the source of supply, and take care that no cripples, as is often the case, are admitted to the non-commissioned rank. Bearing in mind that the great majority of native officers are of the same status in private life as their men, a stricter scrutiny should be applied to their recommendations for promotion.

As Colonel Lance justly remarks :—"As much is not now expected from the company native officer, possibly less care is taken in selecting him, claims of seniority are allowed to have too much weight, and opportunities are not so often given him for the exercise of independent power either in the lines or on parade. It is therefore not surprising that, when called to exercise independent judgment and authority on field service, the native officer of the present day should fall short of the expectations that had been formed of him from the experience of past times."*

17. And lastly, as has been urged by many, and is now carried out to a small extent in some regiments, the commissioned ranks should receive a sprinkling of cadets of good family. The proportion of such commissions might be as a half. This would maintain a leaven of older men amongst the officers. It has been pointed out, that in the cavalry

the direct commission native officer is a complete success. And he is

equally so in the infantry. One regiment has six, seven until recently, of these officers. In Afghanistan in 1879, on one occasion, one of these, then a young jemadar, was directed to cover the retirement of his regiment with a company for two or three hours. The enemy were seen to be gathering in his vicinity and some anxiety was expressed, lest he should delay withdrawal and be cut off.

* United Service Institution of India Journal No. 88, page 320.

As a reinforcement was about to be sent back, the jemadar in question was seen to commence his retirement. He had utilised his leisure hours in erecting a series of small flanking *sangars* on his line of retreat, and he now skilfully withdrew section after section, checking the advancing enemy with volleys from the *sangars*. A well-deserved mention in despatches rewarded him. He is now Subadar-Major, still a comparatively young man, of one of the recently raised Dogra regiments.

Both he and his jemadar, a direct commission kinsman, always obtained good recruits from among their own class, when needed by the regiment.

Another of these officers secured mention in despatches for good political services rendered in Afghanistan, and more recently in Miranzai. The remainder are all good officers, keen to learn everything which their British officers can teach them.

18. It should be remembered, that a native gentleman admitted by direct commission has to undergo a two years probation before being confirmed as a native officer. The officer commanding, wing commander, and adjutant, have therefore every means of appreciating the abilities of the novice, and accepting or rejecting him accordingly.

19. It is a noticeable feature in connection with such men, that they exert a beneficial influence over their clansmen, who evidently hold them in high esteem. The better the family, the more marked this is. The discipline we see in British regiments is more nearly maintained by such men than by the ordinary native officer.

20. These direct commission men might be entrusted with the recruiting of the class they represent. They are unlikely to admit any of those undesirable recruits, who enlist under false pretences, and whose presence in the ranks excludes decent men, and brings the name of the regiment into disrepute in recruiting circles.

21. The field of ambition we throw open to these gentlemen is limited. If they are encouraged to enter our commissioned grades to any great extent, we must devise some means of advancing successful men to posts beyond those of subadar and subadar-major. An enquiry might well be instituted by civil officers among the native gentry, to ascertain their opinions on the eventual bestowal of substantial rewards, befitting the social status of the selected individuals.

22. As regards Gurkhas, their British officers deem the grant of direct commissions inadvisable. None the less important is it for them, that the native officers should be selected for influential, as well as for other good qualities. The British officer, however, is rapidly gaining or has already acquired, an intimate knowledge of the classes enlisted, and in self-defence, will see that low caste men of weak authority, do not gain commissions.

23.—The subject of the improvement of the native officers is not one that can be adequately threshed out in the compass of a short paper.

Conclusion.

A few only of its more salient features have been touched upon. His Excellency the Commander-in-Chief says on this matter, that "no pro-

blem connected with the native army presents, perhaps, so many difficulties, and, in endeavouring to solve it, it is necessary to proceed with much deliberation. No one can be more anxious than I am to increase the responsibilities of a class which fills so important a position in the native army ; a class, too, which has afforded so many examples of devotion to duty and conspicuous bravery. But as things are at present, difficulties crop up at every turn, and the progress is necessarily, and as I have said, advisedly slow."

It is to be hoped, however, that the points raised in this paper will provoke further discussion, and elicit the views and opinions of other officers, on a subject of such momentous interest to native infantry, as the higher education of its native officers.

SHOULD RICOCHETS COUNT ON THE RANGE?

By Capt. I. EARDLEY-WILMOT, Dy. Asst. Adjutant General for Musketry.

Now that in the native army the figure of merit is calculated on the results of the collective practices only, the question of ricochets is forced into prominence. The point I now raise is "Should Ricochets Count on the Range?" It is proposed to divide this subject into two headings, *viz.*, Its bearings, (1) on the Figure of Merit, (2) on the broader grounds of the effect, as a peace training, the present system is likely to produce on the shooting of our troops on service.

We will now take the first question, "Should Ricochets Count for the Figure of Merit?" As long as there is a figure of merit the annual course should, like any other competition, be carried out under similar conditions, and looking at the question from this point of view, I suppose that, amongst those squadron and wing commanders who have given the subject a thought, there are very few who do not agree that the suitability or otherwise of the range for ricochets makes a considerable difference in the figure of merit. I say advisedly, squadron or wing commanders, because not only have paper targets been comparatively lately brought into general use; but also the very large proportion of rounds now allotted to volleys is a very recent innovation, and therefore in this one must go for an expression of opinion to those who can supply the information from their own practical and more recent experience. From my own experience, and from opinions expressed by regimental officers, I gather that at the lowest estimate, the number of ricochets on a favourable range is from 10 to 30 per cent. of total hits. On one occasion I checked a target, of which 47 per cent. of the hits (*i.e.*, nearly half) were ricochets; in other words, that the figure of merit of a regiment firing on a hill range loses from 5 to 15 points, on account of its locality. Some people have argued that the number of ricochets is so small, as to be not worth considering. Of course the only way of practically solving this question is for every regiment to enter on their registers the number of ricochets found on the target, and at the end of the year statistics could be compiled from these returns. The siege operation committee at Dungeness found that *one fifth* of the hits were ricochets. That popular opinion is in favour of the theory that the number of ricochets is considerable, may be judged from the fact, (a) that officers of regiments in the hills speak of it as an undoubted fact, (b) many regiments in the plains take their targets off the trolleys, (which are usually protected by a bank), and place them out in the open, and (c) I am constantly receiving communications from Commanding Officers to the effect that the slightly inferior shooting of their men is due to the paucity of ricochets, caused by the range being rocky or hilly &c. I have seen ranges with about 70 yards

in front of the targets *artificially* levelled, and on one occasion found the ground regularly "leaped" like a tennis court. Regiments would not be likely to go to the trouble and expense which this entails, unless they were assured of the practical value of such a procedure. This again opens a side issue. Why has it become the custom to count ricochets as fair hits in collective and field practices on the range? And do the reasons advanced justify a continuance of this custom? I maintain that ricochets should never count on any measured range. The chief reason why our practices on the range are ten times better than our field practices off it, is that the great cause of errors, viz. 'unknown distance', is eliminated: therefore if a man firing individually at 800 yards gets 0 for a ricochet, why should his ricochet count as a hit because 18 or 19 men happen to be firing alongside him? And why again, because he happens to be on the plains, should his regiment score full points for this same shot, for which in the hills they would get nothing? I think then, it may be taken for granted, that regiments firing in the hills are very severely handicapped, and that if the standard laid down is to be of any value as a test of comparative merit, then the ricochet should not count on the range for the figure of merit.

We now come to the second heading, which is, "whether the fact of not counting ricochets on the range would improve or deteriorate our shooting on service?" It will no doubt be acknowledged by all, that the perfection of volley firing would be for every shot of a volley to hit the *mark* at its first graze, i. e., a clean hit and not a ricochet. The expression "mark" is used in preference to the term "enemy" or "object to be eventually hit", because at times a volley might be morally and actually more effective if all the bullets struck the ground, say two yards short of the enemy, whence they would not only ricochet into the enemy, but also raise such a cloud of dust, as to prevent his taking aim. In this case, of course, the "mark" would be the ground two yards in front of the enemy. But owing to various causes, this ideal shooting is never attainable on service, the chief reason being that the distance from the firer to the object is rarely accurately known. Therefore the *range being unknown*, the probabilities are that the volley will not hit the mark aimed at, and so, under the circumstances, it is better that the distance should be under, rather than over, estimated, so that the bullets should fall short of the mark rather than over it, because a ricochet, if it hits, is as effective as a direct shot. As we cannot then get perfection, we endeavour to get as near to it as possible, viz., by a certain number of direct hits and the remainder ricochets.

When the question as to whether or no a ricochet should count is first propounded to most men, they all say "of course ricochets should count, because a ricochet does just as much damage as a clean hit." But those who argue thus, take too much for granted, and have overlooked a very important point in this theory, viz., *ricochets do not always hit*.

Here again, counting them on the range gives section commanders an erroneous idea of their value, an impression which, off the range or on service, receives a very rude shock; because then it is discovered

that, owing to the conformation or peculiarities of the soil, *ricochets* very rarely hit.

Every one knows how deceptive is the dust caused by ricochets in the plains, especially at long ranges; from the firer's point of view the shots frequently appear to strike quite close to the object, whereas in reality they may have been 200 yards short.

On a range the section commander, and even the officers, are very well pleased, as long as there is a good cloud of dust raised in front of the target, but the practical value of such shooting was amply illustrated at the Akora field firing. There some of the targets were on the hill side, and the result of each volley was that, although the direction was good, yet, owing to want of uniformity in elevation, the shot struck the hill in a vertical line, from about 20 feet above to 60 or more feet below the object. Had this volley been fired in the plains, the section would probably have scored 65% of hits instead of 5%, and its commander would have been proportionately pleased. But now, he not only finds that ricochets do not hit, but he is astonished at the enormous vertical area over which the shots are spread, and the innaccuracy of the several units of his section comes to him as quite a revelation, when he sees its effect on the vertical hillside. One need not necessarily go to the hill-side target to see the enormous vertical area covered by a volley. One has merely to take up a position to one side of any range, and, from seeing how far many of the bullets fall short of the target, to imagine how far below that target those same bullets would strike, were they not intercepted by the horizontal plane: a diagram, which I think, would rather astonish some of those wing commanders, who now pride themselves, on the superior shooting of their companies, as judged by its figure of merit on a range in the plains.

Far be it from my intention to deprecate the value of the ricochet on service, but I would relegate it to its proper place, viz., that of an useful auxiliary.

In calculating the "dangerous zone", ricochets are not included, nor are they counted in the majority of the French and German experiments, because it is well known that their value is an uncertain quantity, and they cannot always be relied on to hit.

For instance, nearly all our wars take place in the hills. Of what value is the ricochet there? In sandy soil, ploughed fields, or in marshy ground, the effective value of the ricochet is *nil*. And so too is the would-be ricochet that strikes the stockade, wall, or *sangar* that protects the defenders' bodies.

Of what value again is the stream of bullets that strikes the ground from 150 to 300 yards short of the enemy, and whizzes away over his head?

Even the ordinary shelter trench has a marvellous power of reducing the number of ricochets. For instance, in 1888 I sat in the butts whilst seven troops of my regiment fired the individual practice of the annual course; the targets that the first five troops fired at were flush with the ground, the last two troops fired at targets, the trollies of which were protected by an 18-in. bank of earth. The average number of

ricochets for the first five troops was 183 per troop, whereas the others only averaged 43 per troop per annual course. On the other hand, I saw 1,400 shots fired in volleys on a hill range, and there were altogether only five ricochets.

The above instance includes so many of the cases that are likely to occur in war, that one is constrained to ask, When then is a ricochet ever of any value? The answer is that as a *prime factor*, the ricochet is practically never of any value, that is to say a *direct hit is as good or better*, but as an auxiliary against troops crossing *hard* ground and in the *open*, it may be and is, very effective, if it hits, and even if it misses the sight of bullets ploughing up the ground and the little clouds of dust thereby raised is not without its demoralising effect on the enemy.

But to return once more to the effect that counting ricochets has on the peace training of the troops. The result that is most noticeable is that no attempt is made to concentrate the shots on the mark by correcting and reducing the number of erratic shots that are ricochets.

The importance of a very careful and accurate aim is not brought home to the men in volley firing, and both they and the officers have a sort of an idea, that as long as the bullets pitch somewhere on or in front of the target, it is all that is required. Having thus shown the ill-effects under service conditions, due to what may be called unintentional ricochets, the next questions to be considered are "by what are they caused, and how can they be remedied?" On a range, the distances being known, the question of incorrect "judging distance" does not come in, so ricochets are due to the inferior marksmanship of the individual, caused by unsteadiness or a careless adjustment of the back sight. And the way to remedy, or, at all events, to very greatly reduce, these ricochets, is simply *not to let them count*. If this were the rule, then company officers would take much more trouble about ascertaining who it was that kept missing the target by striking short. They would take a more solid interest in the improvement of their third class shots; would appreciate the value of the *accurate* adjustment of the back sight, and would thus unconsciously work towards the attainment of an ideal volley, by endeavouring to obtain a *concentration of shots*.

The natural result of this want of concentration is apparent, not only in the loss of moral effect of the volley itself, but the fact also that the shots are spread over so large an area renders it nearly impossible for section commanders to correct the defects due to error in judging distance. If, on the other hand, the distance was wrongly estimated, but the shots were concentrated, it would be very easy for him to make the proper allowances for the next volley, because he would be able at once to determine where the bulk of the shots struck. And finally, good individual marksmanship would be appreciated, and rated at its true value, and there would be less grounds than ever for cynics to remark, that on service a regiment of marksmen is no better than a regiment of third class shots.

Whether the practice of our "best shooting corps" is really as superior to their neighbours in its destructive effect on service, as is

their figure of merit on the range, is a question which popular opinion seems indisposed to fully admit, but whether or no this superiority could have made itself felt, had more attention been paid to concentration, is a point which should be given a fair trial and every practical test in the future.

I am well aware, that from various causes there is an "average error" even in individual shooting, *i. e.*, that no man can put two or more shots running into exactly the same place. In collective firing the "average error" or nucleus (*i. e.* the spot where the general bulk of the shots strike) is of course greater than in individual shooting, and it may possibly be argued, that at 700 or 800 yards, a target 5' high is too small. The present targets are 6' high, but the top foot is painted white and does not count. I would propose then, that at these two distances 1/2 hits should count. Then even at 800 yards, a target with a vertical height of 6' is equivalent to a horizontal depth of about 40 yards, that is to say, that if two shots were fired from 800 yards at a target 6' high, and if one shot just missed the bottom and the other grazed the top, then these two bullets would strike the ground 40 yards apart.

From 600 yards range, they would fall 105 yards apart. Again, a bullet fired by a man lying down and grazing the top of a 6' target 100 yards off, would travel 400 yards beyond that target before it hit the ground; therefore if we substituted horizontal targets for 6' vertical targets, we would find that they are equivalent to a depth on the ground from 40 to 400 yards; and I am of opinion that this area, even at the longest range, is quite large enough, and that any shots which do not fall within that area are practically valueless and should not be counted. In other words, that the range being known, any shots that go above or below (*i. e.* ricochets) a 6' vertical target should count as ~~misses~~.

Should, however, any one not agree with me, in thinking that a 40 yards area at 800 yards is large enough to include all the shots of an ordinary section volley on a known range, then the *principle* I advocate can still be maintained by raising the height of the target, and *so facto*, increasing the equivalent horizontal depth or area. In the same way, at the shorter ranges the target could be reduced in height to correspond with the equivalent area into which, the ballistic properties of the rifle being considered, it is deemed advisable that all bullets should be placed.

As before stated, one of the reasons for the cosmopolitan tendency on the part of the bullets of a volley to fly anywhere and everywhere, is that the sights are not correctly adjusted, and *en passant*, I would call attention to the fact that this branch of Musketry Instruction is very generally neglected. Where the men have not the same excuse, of not being able to read the numbers, it is extraordinary how often one finds the slides on the backsight raised to many other distances besides the correct one. This incorrect adjustment of the slide is done through ignorance or carelessness, and occasionally on purpose but with the best intentions. I refer to the habit, not at all uncommon especially amongst natives, of "intelligently" adjusting the backsight. For example, an object is estimated to be 800 yards off, the section commander to be

on the safe side, orders the men to adjust their sight for 750 yards. The "intelligent" sepoy knows the value, and sees the effect, of ricochets on the range, and thinking that it is better to go low than high, adjusts his slide for 700 yards. A still more "intelligent man" might remember that, in addition, his rifle carries high, and therefore adjust his sight for 675 yards. I have frequently checked a man for not having his sight properly adjusted, and have often had the above reasons given me in excuse for what I naturally thought was carelessness. This "intelligence" in quite to be encouraged in the individual skirmisher, but requires suppression when exercised by a unit of a squad.

Take the above case, if the distance happened in reality to be 850 yards, and if the shots were properly concentrated within the 40 yards area, the section commander would at once see that he had under estimated the distance, but at present, with the bullet striking the ground rather impartially, between 600 and 900 yards, it would be impossible for him to attempt to correct the elevation. There may be a slight difference in elevation required by different rifles, but it is so trifling as to be not worth considering. Very often one uses a 750 yards sight for an 800 yards range, but this is due to the peculiarities of the range or atmosphere, and is the same for all rifles, but this is where the "intelligent" man comes to grief; he fails to recognise the difference between local and service conditions, and thus, unconsciously his bullet and that of his less brain-favoured comrade form, what the gunners call, a bracket, Q. E. N. F.

In the field practices on the range, more especially in the individual field practices such as at moving and vanishing targets, the system of counting ricochets, is, I venture to think, most pernicious. Take for example the vanishing target practice, executed at, say, 100 yards, at a target (native arms) $2' \times 2'$. Owing to the flatness of the trajectory at that distance, the question of judging distance, even if carried out off the range, would not come into it. One sees men shut their eyes and "snatch at" the trigger, and if the trigger happens to be a sufficiently bad shot to indulge in the luxury of "bobbing," the odds are that his bullet will ricochet into the target, and then much to the amusement of the squad, a well known bad shot "gets on" more hits than his far more skilful comrade. In the same way at the moving target, many and many a really bad shot will strike the ground 10 or 15 yards short and whizz away into the target, after which the firer goes off in to the bazar to spent the "well earned" prize.

This system must have the effect of bringing musketry into disrepute, because men see that scoring at these practices is more a matter of fluke than due to any superior individual marksmanship; and also, the man himself gets to think that accuracy of aim is not necessary in these and similar practices. But later on when on service, if firing at an enemy posted behind a wall or stockade, he discovers, to his cost, that no amount of ricochet or "bobbing" will avail him anything.

After all, I think every one will agree, that to ricochet on a range, is a pastime almost exclusively confined to third class shots: why then

should their endeavours to make a miss be frustrated by the accident of the ground?

And finally, as a sort of negative argument, I would mention that I have never yet heard any satisfactory reasons advanced as to why ricochets *should* count.

In conclusion, I would sum up by saying that the argument in favour of *not* counting ricochets on the range are--

- a. It is unfair on regiments shooting in the hills, and produces feelings of discontent amongst those corps.
 - b. Introduces an element of chance, and gives an undue value to inferior shooting.
 - c. Is entirely against the principle of shooting on *measured* ranges.
 - d. Gives section commanders a false feeling of satisfaction as to the effect of a volley.
 - e. Makes it hard for section commanders to know whether or no the distance has been correctly estimated.
 - f. Does not bring home to section commanders the importance of teaching every man to *accurately* adjust his backsight.
 - g. In individual field practices, it detracts from the value of the lessons taught by the individual range practices, by making men forget that absolute steadiness and accuracy of aim are essential.
 - h. There would appear to be absolutely no argument in its favour.
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United Service Institution of India.

PROCEEDINGS of a Meeting of the Council of the United Service Institution of India held at Simla on July 31st 1892.

Present.

HIS EXCELLENCY THE RIGHT HONOURABLE LORD ROBERTS, V. C., G. C. B.,
G. O. I. E., R. A., *Commander-in-Chief in India, Presiding.*

The Hon'ble Lieut.-General H. BRACKENBURY, C. B., R. A., *Military Member of Council.*

Major-General E. H. H. COLLEN, C. I. E., *Secretary to Government of India, Military Department.*

Major-General Sir W. S. A. LOCKHART, K. C. B., C. S. I., *Commanding Punjab Frontier Force.*

Major-General G. E. L. S. SANFORD, C. B., C. S. I., R. E., *Director-General Military Works.*

Brigadier-General G. de C. MOFTON, *Offg. Adjutant General in India, (Commanding Bundelkhand District.)*

Colonel W. L. DALRYMPLE, *Deputy Quarter Master General.*

Colonel K. D. MURRAY, D. S. O., *Assistant Adjutant General.*

Colonel W. G. NICHOLSON, C. B., R. E., *Military Secretary to His Excellency the Commander-in-Chief in India.*

Colonel G. F. YOUNG, *Assistant Quarter Master General.*

Lieut.-Colonel P. J. MATTLAND, *Dy. Secy. to Government of India Military Department.*

Captain F. A. HAYDEN, *West Riding Regiment (Secretary.)*

I.—PRIZE ESSAYS.

I.—With reference to the Prize Essays of 1891-92, it was *resolved*,

(1.) That no Gold Medal be awarded, as in the opinion of the Council, none of the Essays submitted came up to the required standard.

(2.) That the Essays placed by the Referees first and second respectively, *viz.* "Heaven's light our guide," Captain W. D. Thomson, 1st B. C., and "Semper Fidelis," Major G. D. Stawell, Devonshire Regiment, D. A. A. G. for Instruction, be, with the consent of the authors, published in the Journal.

Note.—In addition to the above Essays, three other Essays (making five in all) were received, *viz.* :—

"Mori quam foedari."

"Surtout pas trop de zèle."

"Vis consilii expertus nupit sua."

(3.) The Council beg to acknowledge the valuable services rendered by the referees.

II.—The audited cash account for 1891, the balance sheet for 1891, and the estimate for the last half of 1892, were passed.

III.—The roll of membership as below was presented and passed.

	Life.	Ordinary.	Regtl. Instn.	Exch. &c.
On roll, on 30th June 1891.....	52	594	32	41.
	719			
Joined between 1-7-91 & 30-6-92	11	153	...	...
Removed	5	68	6	...
Remaining 30-6-92.....	58	679	26	41.
	804			

The number of subscribing members on the rolls during the last four years was,

	Life	Ordinary	Regtl. Instn.	&c.
1st July 1889.....	46	472	114	= 632
1st July 1890.....	46	509	104	= 659
1st July 1891.....	52	594	*32	= 678
1st July 1892.....	58	679	26	= 763

IV.—It was *resolved*, that the subject for the Prize Essay of 1892-93 should be,

“Mountain Warfare as applied to India.”

V.—The following officers retire from the Council, having served three years, *viz.* :—

Brigadier-General E. FAUNCE, C. B.,
Brigadier-General A. F. HAMILTON, R. E.,
Major-General G. LUCK, C. B.,
Colonel R. C. HART, V. C., R. E.
Lieutenant-Colonel P. J. MAITLAND.
Lieutenant-Colonel E. R. ELLES, R. A.

Resolved, that their places be filled as follows :—

Brigadier-General FAUNCE. }
Lieut. Colonel MAITLAND. } re-elected.
Lieut.-Colonel ELLES. }

Brigadier-General G. de C. MORTON, *Commanding Bundelkhand District.*
Colonel M. J. KING-HARMAN, *Dy. Secy. to Government of India, Military Department.*

Major F. W. BROMFIELD, *Cheshire Regiment (A. A. G., Bangalore.)*

VI *Resolved*.—That the Executive Committee for 1892-93 be composed of the following officers :—

Colonel W. L. DALRYMPLE, D. Q. M. G.
Colonel G. F. YOUNG, A. Q. M. G.
Lieut.-Colonel E. R. ELLES, R. A., A. Q. M. G., *Intelligence Branch.*

VII.—With reference to the appointment of a Secretary for 1892-93, Captain F. A. Hayden, was re-elected to the post.

VIII.—With reference to the Library, it was *resolved* that,

* 76 Officers' Messes debarred from 1st January 1891, and struck off rolls accordingly.

- (a) the catalogue be revised, and a new catalogue be issued to members on payment of one Rupee, post free.
- (b) a list be compiled of all books, which may not be considered worth keeping longer, and that the list be circulated to the to the council for their approvals to the castings, and that the Executive Committee then refer to the Officer in charge of Government records.

IX.—That an index to the journals, for the period from the first issue in 1871 to December 31st 1891, be printed and supplied free to all members who wish to have it.

X.—The Secretary having brought to notice the great support which has been afforded to the Institution by the branch which has been established at Secunderabad by Major-General C. J. East C. B., Commanding Secunderabad District, and of which Captain E. E. M. Lawford, 1st Madras Lancers, is Honorary Secretary, it was *resolved*,

That the thanks of the Council be conveyed by the Secretary to Major-General East and Captain Lawford for the support they have afforded to the Institution through the branch at Secunderabad, which has supplied many new members to the Institution, and forwarded valuable articles for publication in the journal.

XI.—As regards the monthly issue of the journal which was commenced, as a tentative measure, in January 1892, it was *resolved*,

That the monthly issue be continued for the present.

F. A. HAYDEN, CAPT.

Sec. U. S. I. of India.

July 27th 1892.

The Journal
OF THE
United Service Institution of India.

VOL. XXI.

1892.

No. 95.

At Simla on Thursday July 21st 1892,

By Captain H. V. Cox, D. A. A. G. for Musketry,
Imperial Service Troops.

**THE MAGAZINE RIFLES OF EUROPEAN ARMIES, AND THEIR
PROBABLE EFFECT, IN COMBINATION WITH SMOKE-
LESS POWDER, UPON TACTICS.**

His Excellency the Right Hon'ble LORD ROBERTS, V. C., Commander-in-
Chief in India, in the Chair.

THE CHAIRMAN :—

YOUR EXCELLENCY, LADIES, AND GENTLEMEN,—In introducing Captain Cox to you, I will, with your permission, say a few words on the subject of the lecture with which he is about to favour us. As you are doubtless aware, the fighting efficiency of infantry depends on its being able to pour an accurate and well-directed fire, and at the decisive moment of the conflict, an extremely rapid fire, on the force to which it is opposed. The magazine rifle, therefore, should enable a soldier to carry out this duty with much greater certainty and destructive effect than heretofore, provided only that he has been thoroughly trained in peace time to use it effectively.

It must be remembered that the more perfect the tool, the more skill is required from the workman who uses it, and unless fire discipline is most carefully inculcated and enforced, the rapidity of fire which the magazine rifle admits of will undoubtedly lead to a waste of ammunition. Even when the magazine is not in use, the much longer range of the new weapon will rather tend to a similar result. The temptation to resort to long range fire will be much greater than before ; and for such fire to be really efficacious, it should only be made use of under the orders of some duly qualified authority, who can judge the distance correctly and keep the men whom he is directing under strict control.

Unfortunately no statistics are available to show the amount of ammunition expended on the different sides in the principal engagements of the Peninsular and Napoleonic wars ; but I am inclined to think that the proportion of casualties to the number of rounds expended has not increased since that period to the extent which might have been anticipated from the improvement that has taken place in the infantry soldier's fire-arm. On the contrary, it would not surprise me to find that in more recent wars the proportion of casualties has actually diminished, for the following reason :—First, the greater facility in loading, which is apt to generate hasty firing ; secondly, the tendency to make use of long range fire, whether it is likely to be effective or not ; and, thirdly, the comparatively short time available in which to train the soldier of the present day in marksmanship and fire discipline. In confirmation of this view the following figures may be quoted. The loss in killed and wounded at Marengo was one-fourth of the total number of combatants engaged, at Austerlitz one-seventh, at Jena one-sixth, at Eylau, Salamanca, and Borodino one-third, and at the siege of Delhi in 1857 about the same ; at Waterloo the English loss was one-fifth, that of the French being unknown. Up to this time the infantry were all armed with smooth-bore muskets. The first great war in which rifles were in general use on both sides was that between France and Austria in 1859. Ammunition was very freely expended during this war, and yet at Magenta and Solferino the loss was only one-eleventh of the total forces engaged. At Königgrätz in 1866 the Prussians were armed with the breech-loading and the Austrians with the muzzle-loading rifle, the loss being one-fifteenth ; and during the Franco-German war, both sides being armed with breech loaders, the loss at Woerth and Spicheren was one-eighth, and at Gravelotte one-eleventh.

It would seem therefore that, since the introduction of modern rifles, the larger quantities of ammunition expended have not produced any commensurate effect. I think too it will be found that the better trained and led the troops are, the less the average number of rounds required to obtain decisive results. During the war between France and Germany in 1870-71, the XIIth German Army Corps fired only an average of some 11 rounds per man throughout the various battles in which it was engaged, while on several occasions, more particularly when the preparatory action of artillery had been neglected, the French, who we all know were beaten, used up all their available cartridges (from 90 to 108 per man), and had eventually to retire for want of ammunition. Again, during the operations at Plevna in 1877, 160,000 Russians fired 10 million rounds, while 70,000 Turks fired no less than 15 million rounds, the total number of killed and wounded amongst the former being 40,000 and amongst the latter 30,000. Leaving out of account the losses caused by the 200,000 rounds fired by the Russian artillery, and the 80,000 rounds fired by the Turkish artillery, this gives an average of nearly 360 rifle shots to each casualty.

It is impossible to calculate with any exactness the proportion of casualties in action due to the fire of infantry or artillery, or to the sabre of the cavalry, but in view of these figures and similar ones which

might be quoted, it is hardly surprising to learn that the average efficacy of rifle fire, even at short ranges, is estimated at less than one per cent. If the British and Native infantry could be so trained as to make it certain that one bullet out of every twenty would hit the object aimed at—and this surely is not very much to ask—they would be five times as efficient as the troops of any Continental power have yet shewn themselves to be.

You will perceive, then, how essential it is to our success in war that we should pay unremitting attention in peace time to marksmanship and fire discipline. In England great difficulty is experienced in obtaining suitable ranges for practice with the magazine rifle; but in India we are free from this disadvantage, and it will be our own fault if we do not turn the new arm to the best account. It is particularly incumbent on us to do so, for the army in this country is by no means in excess of our military requirements, and the distance by sea which separates us from our English base would prevent our being able to rely on receiving reinforcements with certainty and rapidity.

I will not attempt to discuss the tactical effect which the introduction of a small-bore magazine rifle and smokeless powder may be expected to produce in future campaigns. This point will probably be dealt with by the lecturer. I will only remark that, in a conflict between approximately equal numbers, the advantage would seem rather to lie with the defence, assuming the troops on either side to be equally well trained and disciplined, and an adequate supply of ammunition to be forthcoming. If the average percentage of fire efficacy could be improved to the extent I imagine to be feasible, it would be almost impossible in daylight to deliver a front attack upon a well-posted enemy without suffering extremely heavy loss, and for this reason it seems not unlikely that night assaults may be more frequently resorted to than heretofore. The manoeuvres at Meerut proved that an attacking force can operate to the best advantage by moonlight, which enables the men to see their way and keep touch with each other, while at the same time it is not sufficient to define surrounding or distant objects clearly enough to admit of an accurate fire on the part of the defenders.

In concluding these introductory remarks, I would again remind you that, as our army is numerically weak, it becomes more necessary for us than for any Continental power to maintain and increase the fighting efficiency of every soldier serving in its ranks. Our infantry has always been celebrated for the coolness and accuracy of its fire. In the interesting *Memoirs of Baron de Marbot*, which have lately been published, that officer, who saw much service in the Peninsula as Aide-de-Camp to Marshal Masséna and other distinguished French commanders, in discussing the chief cause of Wellington's success in driving the French out of Spain, says:—

“In my opinion, the principal cause of our reverses, though one which has never been pointed out by any soldier who has written on the Peninsular War, was the immense superiority of the British Infantry in accurate shooting—a superiority which arises from their frequent exercise at the targets.”

If we are careful to maintain the superiority we possessed nearly a century ago, and are determined that the marksmanship and fire

discipline of every branch of our infantry, whether at home or abroad, shall keep pace with the improvement in the weapon with which it is armed, I feel confident that we shall still be able to hold our own against any enemy we may be called upon to encounter.

PART I.

YOUR EXCELLENCIES, LADIES, AND GENTLEMEN,—Before going into the various kinds of small-bore magazine rifles as adopted by European nations, we may well consider very briefly the causes that have rendered these kinds of rifles necessary.

The one and only good reason for the introduction of the magazine is to place a store of cartridges at the disposal of the soldier, which can be used as rapidly as possible when rapid fire is advantageous. The opponents of the magazine declare that we have in the M. H. rifle a very handy and rapid firer, and that nothing more is required.

In a lecture delivered before the Royal U. S. I. in 1887, Captain James pointed out that this argument does not hold good, and that the sole reason for the introduction of the magazine is to enable troops to pour in a shower of bullets at a moment when increased intensity of fire would decide a battle, or as he vividly puts it, to convert the ordinary shower of bullets into a blinding rain.

That the magazine renders this possible is shewn by the trials in rapid fire between the Lee-Metford and the Martini-Henry.

The Lee-Metford, even in experimental form with a magazine which only held five rounds,—the magazine of the present mark II holds ten, remember,—fired ten aimed shots in 14 seconds. The Martini took 23 seconds to do the same. With mark II, the rate would probably be quite double as fast as the M. H.

This rate cannot be sustained it is true, for a fresh magazine must be attached, or the original one re-loaded, when ten rounds of magazine fire have been expended. But the intensified fire is only necessary for a specified purpose and at a given moment: once that purpose is accomplished and the moment past, magazines will be again replenished and single-loading fire continued till another crisis occurs. The next point to take into consideration is, why are small-bore rifles necessary?

Because a high muzzle velocity, great range, and flatness of trajectory, are absolute necessities with modern rifles. These, so far as we know at present, can only be obtained by what is known as a favourable $\frac{d^2}{w}$, where d is the diameter and w the weight of the bullet. Hence with a given weight of bullet we must reduce the diameter to get a favourable $\frac{d^2}{w}$, and herein lies the great reason for the introduction of the small-bore rifle.

I feel that I owe an apology here to those of you who have gone through a musketry school for thus re-introducing you to an old and dreaded enemy, but I assure you I do not mean to refer to $\frac{d^2}{w}$ again this evening.

Two great advantages following the introduction of the small-bore rifle with its little cartridge are, (a) decrease in weight of ammunition, whereby the soldier is enabled to carry more, and (b) economy of space in the magazine.

A great deal of interest might be said as to the history of magazine arms (the earliest endeavours in this line date back over 200 years), and as to the various phases they have gone through in Europe and America, but we are more concerned with the last thing out than with ancient history in these days, so I will not trouble you with anything of the kind.

I have been warned solemnly by Colonel Ian Hamilton that a Simla audience won't stand figures. They don't appear to object to them when they come from the currency association, but I can quite believe are not so anxious about them in a musketry lecture, so that in my attempts to describe to you the rifles of European nations, I shall as far as possible avoid them, and will ask you to refer for them to the printed table of the latest forms of magazine rifles which is distributed in the room.

The Austrian Rifle —Is a magazine small-bore .315.

The reason I describe this rifle first is that its magazine system has been largely adopted on the continent.

The cartridges are packed in a clip made of tin containing five. Two of these are wrapped round with paper, and thus issued to the soldier. The clip with its contents is put into the magazine, and when the five cartridges have been fired falls out automatically.

The peculiarity of the action of this rifle is that the bolt draws straight out, and is pushed straight home again without locking by a quarter turn. The Austrians claim that in consequence of this the rifle can be fired very rapidly without removal from the shoulder.

The disadvantages are—

1st.—That the extraction is a straight pull back, and the powerful cam action set up by all rotary bolt heads at the critical moment of extraction, viz., its commencement, is absent. Thus the rifle is apt to jam, and what is worse, the soldier is tempted even in peace time to place the butt of the rifle on the ground, and trust to a stamp on the bolt head to exact a stiff cartridge, a manœuvre that used to be common with the Snider, but which is distinctly bad for the rifle.

The second disadvantage is that the recoil acts on the rear part of the bolt, where it is checked by a kind of falling block. The bolt in front of this block, therefore, has to be very strong, and the whole arrangement adds considerably to the weight of the rifle. It is also stated that the bolt recedes from the cartridge at the moment of explosion, and this of course materially affects good shooting. The sights are too complicated for a service arm. Mänlicher is said to have introduced the rotary bolt head for the infantry rifle lately, and an ingenious method of securing the same advantages in the carbine, but I am not aware that either have yet been adopted in the Austrian army.

The Austrian soldier carries 116 rounds. By the kindness of General Brackenbury, I am able to give you the following interesting information as to the Männlichers in Chili. "An English naval officer personally counted more than 300 Männlichers with their breeches blown out. As there were certainly not more than 4,500, and probably not more than 3,500 of these rifles in the army, and as he could not have seen half of the whole number damaged, the proportion rendered inefficient must have been large, and yet the campaign only lasted a week. The rifle appears to have shot well, but to be too delicate a weapon for ordinary service, and too complicated for imperfectly trained men." The above account confirms the general idea that the breech action is an exceedingly weak one.

The English Rifle.—As through the courtesy of General Walker, I am able to shew you what I believe is the only specimen of the Lee-Metford in India, I need not enter into any long description of the arm in question.

After repeated and prolonged trials at home and aboard, the American Lee bolt and magazine, with the Metford rifling, has been finally adopted for the British army.

The one I have here is mark I modified.

The principal improvements in mark II, are, I believe,

- (a.) Improvement in the bolt and its action.
- (b.) Improvement in the sighting.
- (c.) Connection of trigger and sear by a knuckle joint to prevent jamming.
- (d.) Improved magazine spring.
- (e.) A magazine to take ten cartridges instead of eight. These are placed in a double row.
- (f.) Extractor to be placed centrally, and surface of claw increased.
- (g.) Cleaning rod shortened. Two screwed together will remove a jammed case or bullet.
- (h.) External diameter of barrel slightly reduced after first six calibres.
- (i.) The fore-end of stock to be fuller where gripped by the hand and the grooves omitted.
- (j.) A cover to protect the firer's hand from the heated barrel.

The Lee-Metford is now being re-sighted for cordite, and hence the recall of the rifles which were in India. 30,000 are expected from England shortly, but I am sorry to see they will be mark I modified, and not mark II. Cordite will probably disappoint marksmen, for it is not as regular in its action as black powder. The increased accuracy of the Lee-Metford with black powder over the M. H. has just been shewn by the result of the match between the Hythe School of Musketry and the North London Rifle Club, in which the former used the Lee-Metford and won easily.

A new smokeless and flameless powder called "Apyrite" has been invented by a Swedish Chemist. It is said to give less pressure in the bore and a higher muzzle velocity than cordite. Reports on it by English experts are said to be very satisfactory, but it has, in any case,

many tests to pass, before it can be accepted as suitable for the British army.

Mark II is sighted on the backsight up to 1,800 yards, and on the dial up to 2,900. The fixed sight, viz. 500 yards, is obtained by pushing the sliding bar to the top of the leaf when the latter is recumbent.

Its principal advantages over the M. H. rifle are —

(1.) Its flat trajectory, the culminating point of the trajectory above the line of sight with the 500 yards sighting being, with the Martini 11 ft. 6 in., with the Lee-Metford 4 ft. 9 in.; with 800 yards sighting, 29 ft. 6 in. and 14 ft. 9 in. respectively. Thus we see the trajectory has been brought down more than half its height by our little friend here.

(2.) Great diminution of recoil. The recoil of the Lee-Metford is I believe 5 foot-pounds as against 14 foot-pounds Martini-Henry, I have fired with the new rifle using black powder, and found the recoil almost imperceptible. This diminution of recoil is most important, and will lead to a very great improvement in shooting; we all know how many of our 3rd class shots are 3rd class shots simply because at one time or another the old M. H. has been loosely held by them, and has caught them such a kick on the shoulder that they have a lively remembrance of it ever after, and nothing that the most patient of instructors can say or do will wipe out the "funk" then established, and they are confirmed "bobbars" once and for always, their target practice usually resulting in what I once heard an old soldier call a "good steady miss. Those of us who have fired 40 or 50 rounds from the M. H. in quick succession know, that although one may not feel it at the time, a sore shoulder is generally the result.

At the battle of Gravelotte the French troops defending St. Privat fired 80 rounds a man, and during the war of 1876 the Turks in defence constantly fired 100 rounds a man a day.

(3.) The magazine, with its admirable "cut off," by which the commander is enabled to have a store of ten cartridges in the rifles of his men ready for instant and rapid use on emergency.

(4.) The decrease in weight of ammunition. The cartridge of the Lee-Metford weighs one ounce. Therefore 115 weigh about the same as 60 M. H. cartridges.

(5.) The moral effect on the soldier of knowing that he has the most modern arm possible, with what are held to be the latest improvements, in his hand, and is, so far as military science can help him, not worse off than his enemy. The demoralizing effect of the knowledge of their inferiority in armament was, we know, a great cause of the Austrian collapse in 1866. In 1870 the German needle gun was very inferior to the Chassepôt, and the German infantry constantly advanced 600 yards under aimed Chassepôt fire without the power of reply, a very severe trial and perhaps the best possible proof of their admirable fire discipline. In the late war in Chili the Männlicher, in spite of its faulty construction, proved its superiority over the single-loader, and the possession of it by the Congressists is said by many to have been one of the principal causes of their victory. An eye witness writes,

"Balmaceda's troops could not latterly be got to face Männlicher, and the Congress troops looked upon the magazine rifle as a sort of fetish."

The disadvantages of the Lee-Metford as compared with the M. H. rifle are—

1. A more complicated mechanism and increased number of parts, roughly 88 against 45.

2. Less handy to drill with, and therefore disliked by Serjeant-Majors.

3. The diminished size and weight of the bullet, which makes it very susceptible to the influence of wind at the longer ranges.

4. Last but not least, the doubt as to whether it will stop a cavalry charge or a rush by savages. This important question I will lay before you in greater detail in the second part of my lecture. As regards the rest, I think you will agree with me that the advantages of the new rifle, even as feebly set forth above, far out-weigh its disadvantages.

I now wish to draw your very particular attention to a great difference between the Lee-Metford and the Männlicher, two typical small-bore magazine rifles, a difference which involves tactical questions of the gravest importance.

In the Lee-Metford the full magazine can be closed from the action of the rifle by the "cut off," and the rifle used, until occasion arises, as a single-loader. In the Männlicher, the magazine once filled must be emptied, and only when the magazine is empty can the rifle be used as a single-loader.

The question thus arises: Is the magazine to be looked upon as a means of accelerating the fire of all arms generally and throughout an action, as the military authorities of some great Continental nations seem to think, or is it to be regarded as a means of storing a certain number of rounds in so handy a manner, as to ensure their being available at the moment when increased intensity of fire may decide the fate of the combat? The latter is undoubtedly the view taken by our authorities.

The question seems to turn upon two things,

1. The sort of fire infantry should generally deliver, especially in attack.
2. The supply of ammunition.

If it be granted that infantry are to adopt, and are capable of usefully adopting, independent fire in attack at even medium ranges, and are to act each man for himself and without special direction as to objective or guidance of any kind from their commanders, and if the supply of ammunition be absolutely unlimited, then by all means away with fire discipline and the cut off together, and from as long a range as possible let us pour forth an indiscriminate hail of bullets.

But, on the other hand, knowing as we do the great and increasing difficulties which beset the supply of ammunition to firing lines once committed to attack, and taking into consideration the enormous advantage volley firing confers in throwing choice of the objective on the educated commander, instead of on the soldier, the proved moral and physical effect of steady volley firing on the enemy and the incapability of the

soldier himself to estimate distance accurately, or to judge for himself when he should fire quickly and when slowly, we are perfectly justified in regarding the magazine as only to be drawn upon when the right moment occurs, and not as a means of generally accelerating the fire of our infantry, and I feel sure that if this principle be thoroughly instilled into the minds of our soldiers, and more strict fire discipline than ever insisted upon, it will give us an advantage on the next European battlefield on which we take part, the value of which cannot be over-estimated.

The French Rifle.—The French had two kinds of quick-firing rifles in use up to 1887, neither were satisfactory; and in 1888 the Gras-Lebel was adopted. This is now being superseded by the Berthier, a true small-bore magazine rifle, for particulars of which I am indebted to a paper by Colonel Hemans published in the journal of this Institution in March this year.

The rifle has a bolt action. The magazine is not attached to the rifle. It is a metal clip containing 4 cartridges. To use the magazine it is dropped into the breech of the rifle, and the cartridges are fed up one by one by means of a spring. When the last cartridge is pushed into the chamber, the magazine falls through automatically, and another can be dropped into its place.

This rifle can be used as a single-loader; a lever is fixed at the side, and when turned arrests the feeding action of the spring above mentioned. A reserve of only 3 cartridges does not appear to be sufficient, unless the replenishing of the magazine be exceedingly rapid and simple. A drawback to our own magazine is that once emptied it takes time to refill. Eight cartridges can be put into the magazine of the mark I. I have here in about 16 seconds. It seems a pity that we cannot devise a plan of replenishing our magazine *en bloc*. The French rifle has by all accounts been highly tried, and it is said that for rapidity of fire, simplicity, handiness, and general efficiency can compare favourably with any other small-bore magazine rifle. The soldier will carry 100 rounds, weighing 6 lbs. The rifle takes the English .303 ammunition, and the ballistics would be identical.

The German Rifle.—The Germans got rid of the needle gun as soon after the war of 1870 as possible, adopting the Mauser which they converted into a magazine rifle. They have now a small-bore magazine rifle, which is called model 1888.

The action is the Männlicher modified. The recoil is sustained by wings on the bolt, which fit into recesses near the chamber. The loader or clip, which contains 5 cartridges, fits into a rectangular groove at the bottom of the body.

As the action is set in motion, a spring or elevator forces the top cartridge up into a position in front of the chamber into which the bolt pushes it. Immediately the last cartridge has been fired, the clip falls to the ground, and the elevator remains at such a height as to convert the rifle into a single-loader. This rifle, like the true Männlicher, cannot have a store of cartridges in its magazine and yet be used as a single-loader; in my opinion a very grave defect.

A peculiarity of this rifle is its barrel. The barrel proper is hidden in a casing of thin steel. This casing is separated from the barrel proper by an air space of $\frac{1}{80}$ of an inch. The two barrels thus separated are screwed into the body, and at the muzzle end the false barrel is tapered in, until the space between it and the true one is imperceptible.

It is stated that it was found that the fixtures of sights, bands, etc., on the actual barrel caused an unequal expansion under rapid fire, and thus interfered with accurate shooting. Also that the false barrel prevents the sight being melted off in rapid firing, and protects the soldier's hand from being burnt. The German soldier carries 150 rounds, weighing just over 11 lbs.*

I had intended to have given you, so far as I have been able to collect information, a more or less detailed description of the rifles adopted or about to be adopted by the other European nations, but time will not permit of this. I must again refer you to the printed table, and will only give you a few particulars which could not be included in it.

The Italians are discarding the Vitali and adopting a modified Mänlicher rifle, calibre .301; 170 cartridges are to be carried by the soldier. 30,000 of these rifles are to be ready by the end of the present year.

The Swiss rifle, calibre .295, is the smallest now in use in the armies of the world. The breech action is a bolt with straight forward and backward motion. The magazine is introduced from below and contains 12 cartridges, fed from clips containing 6 each. Feeding the magazine is said to take 6 seconds. The rifle like our own, can be used as a single-loader with the magazine full. The Swiss soldier carries 100 rounds on his person.

The Russian army is still in possession of the Berdan rifle, a single-loader. Latest advices, however, shew that the Russians have decided to adopt eventually a small-bore magazine rifle, with bolt action very similar to our own. An Austrian officer stated in a lecture at Budapesth in March of this year, that most of the Russian regiments on the German and Austrian frontiers are already in possession of this rifle. This appears to require confirmation, as it is believed that a very large order was given to France for the manufacture of this weapon, but that for want of money the order has been wholly or partially cancelled. The Berdan is now being re-sighted for smokeless powder, which looks as though re-armament is postponed for a time at least. There is also a strong party in Russia, at whose head is General Dragomiroff, opposed to the introduction of a small-bore rifle. So we may predict that Russia will be the last of the Great European Powers to complete the adoption of a rifle of this description.

Among other inventions just submitted to the Small Arms Board in America is the Pitcher magazine rifle. In this peculiar gun the

* For a full description of the German magazine rifle, model 1888, see U. S. I. of India Journal, No. 84, 1891.

recoil of the first cartridge fired is used to fire the next, and so all the remainder in the magazine go off of their own accord; and all the soldier has to do is to hold the gun straight and look on. The idea is original, and suggests all sorts of possibilities.

PART II.

I will now, in as few words as possible, make some suggestions as to the effect of small-bore magazine fire with smokeless powder upon tactics.

1.—We may take it as proved that smokeless powder very materially strengthens defence, not only because the position is not indicated by smoke at which fire can be directed, but owing to the greatly increased difficulty of reconnaissance. The attack too can no longer trust to being more or less covered with a cloud of smoke, as they approach the fire-swept zone of the defence near a good position where their enemies' fire will be most deadly. This may have the effect of hastening what is called abroad the decisive action of infantry. The foreign authorities hold that this will take place somewhere between 1000 and 400 yards, but then perhaps they do not attach sufficient importance to the bayonet charge. I think, however, it is more than likely that volley firing will be impossible within say 400 yards, and a general and rapid advance, combined with magazine fire, will have to be made from that range, preparatory to a charge with the bayonet at a distance from the position of about 250 yards.

2.—Late foreign manœuvres lead to the conclusion, that of all three arms, cavalry will be most affected by the use of smokeless powder by infantry and the increased range of the rifle bullet. I do not mean only when charging infantry, but when employed on reconnaissance, or against cavalry just prior to a general engagement. Over and over again we read of cavalry in masses being under long range fire often without the least idea of where the fire came from.

3.—It seems to be generally admitted that infantry deployment for the attack will be more distant and more difficult than formerly. Faulty deployment will be promptly felt even at very long ranges, and, once committed, mistakes cannot be rectified. Troops will probably be frequently moved into position for attack by night, and thus marching and combinations by nights will become of great importance. Nothing requires more careful practice and study in peace time than such operations.

4.—There will be fewer direct attacks on a good, or even a fair, defensive position.

5.—Attacks will have to be more carefully prepared by artillery and long range infantry fire. This was the great lesson learnt from the manœuvres of the IXth German army corps in 1890. Also, whenever possible, the attacking troops should be supported by the fire of stationary infantry and machine guns from good positions on one or both flanks.

The absence of smoke will lessen the danger of these flank supports firing into their friends. Our present attack formation is too deep and the advance too slow. Colonel Slade says, "we may yet resort to a modification of former tactics, and see a cloud of skirmishers advancing in a general line, and covering by their fire the troops destined for the assault, who would push on in a loose line. Simplicity of formation, rapidity of advance, and intensity of fire, will be the characteristics of attacks in the future.

6.—We may fairly conclude that the numbers of the attack must be in greater proportion than formerly to the numbers of the defence, and in consequence of this, and of the heavy losses even medium range combat will entail, the massing of troops opposite critical points on a battle-field will be more important than ever. This again will necessitate closer and more extensive reconnaissance, and better information, thus throwing more work upon cavalry. Manœuvres with smokeless powder prove that surprises and ambushes are likely to be more frequent. This again will render examination of ground more necessary. Here we may well consider how cavalry can, in the face of an improved and far-reaching rifle and smokeless powder, carry out such reconnaissance. A moment will arrive when opposing armies are, say, three or even five miles apart, when further and closer reconnaissance by even cavalry superior in strength to that of the other side will become extremely difficult, and yet such reconnaissance will be undoubtedly asked for. The French in the eastern manœuvres of last year appear to have realized this, and to have attempted to solve the question by pushing forward on such occasions specially trained battalions of infantry in support of the cavalry. When the latter found themselves unable to proceed further, these mobile infantry, having marched at a very rapid rate, came up, engaged or brushed aside the enemy's advanced posts or parties, and thus enabled their own cavalry to make another bold dash forward in search of information. Whether this, or the employment of mounted infantry for the like duty in support of cavalry, be the better way, I think you will agree with me that the question is an exceedingly interesting one, and will repay thought and discussion. The parties of cavalry employed on this most important duty should be very small and numerous, and to prevent counter action by the enemy's cavalry, the infantry support should follow as closely as possible. I am disposed to consider therefore, that the object will be best attained by mounted infantry.

5.—The use of every advantage afforded by the ground over which an attack is made, will be of the most vital importance. Mistakes will be punished by nothing short of destruction. Thus more responsibility will be thrown upon subordinate commanders, and our non-commissioned officers and men must be more carefully taught the value of even the smallest cover from fire in attack. This is only to be done by placing the troops you wish to instruct in defence, and by making them note the mistakes those attacking them commit; by pointing out to them how by neglecting to avail themselves of a fold in the ground here, or the cover of a bund there, their opponents have remained for so many minutes

unnecessarily exposed, and how this with modern rifles would mean destruction. Not a bit of colour, brass, or steel, should be allowed to betray the whereabouts of defence or attack, and, when in the field, everything glittering should be removed from the dress or arms of troops, horse, foot, or artillery. We may congratulate ourselves that the army in India is in this respect, as in many others, ahead of the rest of the world.

6.—Fire discipline, control, and direction must be better than ever, for it is only by the exercise of these qualities in their highest sense, that the attack can hope to beat down the fire of the defence, ensure that its own magazines will be full at the critical moment, and regulate its expenditure of ammunition, which last will be enormous, and out of all proportion to the effect produced, if it ever gets beyond control. It is evident that smokeless powder will much facilitate fire discipline, control, and direction.

7.—The supply of ammunition must be more carefully practised in peace time in attack, and be more systematic than is generally the case. Government would do well to largely increase the annual allowance of blank ammunition, so as to enable our peace representations to be in this respect more suited to modern war: 50 rounds in pouches and 40 rounds in reserve would sound a curious field-day order now, but not half so grimly humorous as the accustomed peace manœuvre order "five rounds in pouches and five in reserve" would be, if issued to a brigade falling in to attack a position with magazine rifles, and one should be as like the other as possible.

8.—Judging distance, though as important as before at long ranges, will not be so necessary at the medium and short ranges, owing to the flat trajectory. At the long ranges help is obtainable from artillery, or if artillery be absent, more time is available for infantry range finding.

9.—The course of a battle will be more difficult to follow than before, and this would seem to point to decentralization of command and more freedom to subordinate commanders, but on the other hand visual signalling and probably balloons will be more extensively used, and will assist both previous reconnaissance and subsequent direction of the fight.

10.—Night assaults will be more frequent in civilized warfare, as by a night assault the officer directing operations may hope to avoid the terrible losses consequent on fighting by day. This was to some extent foreshadowed in the war of 1870, where the vantage points of a battle-field, taken and retaken during the day, were often finally disposed of by an assault just after dark. Increased numbers will on the other hand be necessary on outpost duty, and probably electric search lights will be used round important positions. The search light was used against a night attack on a large scale in Germany in the late manœuvres, but was not at all successful. It is the British army that should bring the night assault to as near perfection as possible, (1) because its numbers are so small, that it cannot afford heavy losses; (2) because the

bayonet is the arm which has so often proved victorious when used by British infantry, which has won them their glorious traditions on countless battle-fields, and it is by the bayonet and close quarters, that a night assault alone can succeed ; (3) because our officers can be relied upon to show self-reliance and nerve, which are qualities most necessary for the guides and leaders of an assault by night.

British troops will melt away as rapidly as others under a withering fire in attack, for a stout heart cannot prevent one's being hit, but in defence, in assault, and at close quarters the British soldier will be found as much the better man as he proved himself to be at Waterloo, Badajos, or Inkermann.

11.—Owing to the increased penetration of the rifle bullet, villages and houses generally, unless previously prepared, will lose a great deal of their value on the modern battle-field. The small-bore bullet can cut down the side of a modern built house or garden wall in a very short time. The profile of shelter trenches will have to be increased to over two feet of earth in front to give good cover.

12.—Smokeless powder will be a great advantage to a small body holding an important position, such as a party of cavalry holding a defile, or an infantry advanced post in defence.

13.—This brings me to the last, and perhaps the most important considerations of all, viz. 1. the general result of modern rifle fire when civilized infantry is fighting against civilized infantry, and 2, the stopping power of the small-bore bullet against a cavalry charge, or rush by uncivilized or fanatical foes.

We must bear in mind that an infantry soldier has to exert himself to march and run over rough ground, to constantly kneel and rise again, and to sustain his fire in the attack, carrying his arms, ammunition, and accoutrements all the time, in fact testing wind, muscle, and nerves to their utmost power. Thus a comparatively slight wound will be quite sufficient to put him *hors de combat*. Also, that taking into consideration the facts, that the trajectory of the small-bore is twice as flat as even the M. H. rifle, and that the magazine renders it probable that nearly double the amount of ammunition will be expended in an infantry fight, and that these combined with smokeless powder will render good marksmanship more effective than ever, we may take it, that twice the number of men will be hit between the distances of 1000 and 200 yards ; or to put it another way, the chances of even a slight wound are doubled. The great result for infantry v. infantry will be, not a large increase in the number of killed, or even of very seriously wounded, but that the number of slightly wounded will be doubled. Unless these slightly wounded men are attended to at once, their wounds will become serious from want of attention alone, and owing to the enormous number of such wounds, immediate attention to all will be impossible. Improved medical arrangements will no doubt be made, but that they will be able to meet the case with moving armies in the field is not to be hoped for.

The mobility of armies in the field will in any case suffer by largely increased field hospital establishments, and huge bearer columns.

As a result of all this, I venture to suggest that the wars of the future will be shorter and more decisive than ever, as far as regards the fighting of field armies. One or two general actions must bring the field army which is the less efficient on to its knees. The wars of 1866, 1870, and 1876 go to prove this. The war of 1870 was prolonged by the resistance of Paris, but was virtually closed as far operations of field army *v.* field army were concerned by the capitulation at Sedan. Only the defence of Plevna lengthened the war of 1876. Thus, though isolated fortresses may prolong war by the time necessary for their reduction, true field operations will be shorter and sharper, and the ultimate issue of war will be more rapidly decided.

As regards the stopping power of the small-bore bullet against a cavalry charge, it is curious that the Continental authorities do not appear at all disturbed in their minds as to this momentous question.

In an article on modern rifle bullets and their effects in the R.U.S.I. Journal of April, 1892, Dr. Godwin describes the results of certain French experiments with the small-bore bullet, and gives the conclusions arrived at by two French Surgeons who watched the experiments. These conclusions briefly were that the Lebel bullet has at short ranges, up to 380 yards, an explosive effect. That this effect, and therefore the severity of injury, is in direct proportion to the velocity of the projectile, and the amount of resistance it meets with. This the French Surgeons proved by the results of firing a Gras and a Lebel bullet with equal velocities, when the bigger and heavier bullet at once shewed its superiority. The increased velocity of the Lebel, however, quite compensated for its deficiency of weight and diameter.

Dr. Godwin also gives the results of some experiments made in England with the Lee-Metford bullet at carcasses of horses at a short range, viz., 100 yards. He says in all these cases the so-called explosive effects upon tissues, whether hard or soft, were most marked. Hard compact bone was split into pieces, joint ends of bone were completely smashed, and such injuries were inflicted as would have been of the gravest character. Please note the remainder of his account. In several instances the envelope of the bullet had yielded when striking some resisting part of the bone, the lead had then escaped, leaving an empty doubled up case in its track. In such cases crushed bone and particles of lead were found in the pulped muscles. Since these experiments were made, the cupro-nickel envelope of the bullet has been strengthened and is less liable to yield. I will read you an extract from Colonel V. Lobell's report upon the progress in Military Matters in 1890, translated by Colonel Hildyard and published in the Royal United Service Institution Journal of November 1891. He says, it will not be superfluous to impress frequently on the men, that the present infantry bullet causes a slighter wound comparatively than was formerly the case, at those distances at which in a future war the decisive action (infantry *v.* infantry) will take place, that is at a distance somewhere

between 1100 and 440 yards. The great penetration and hardness of the bullet causes a clean passage without dangerous splintering of the bone; the frightful breaking up effect of the modern infantry bullet shews itself at the distances between the muzzle of the rifle and 330 yards.

An able article in the *Army and Navy Gazette* of this year refers to a paper by Dr. Marsh, in which he makes the following deduction as to the stopping power of the Lee-*Metford*. "The bullets of small calibre rifles have firstly diminished shock and stopping power on individual wounded, secondly, their wounds are clean cut, decreased in size, and with very little destruction of the part traversed by the ball."

The same article states, that during the street fighting in Portugal in the early part of this year, the wounds at close ranges are said to have been of a most severe character.

Again, two articles in the *Revue du Cercle Militaire* of this year, summarizing the effects of modern small-bore bullets, state that there are three distinct zones of action of the bullet during its trajectory.

First, a zone of explosion.

Second, a zone of penetration (without explosion).

Third, a zone of contusion.

Lastly, that the zone of explosion varies directly with the flatness of the trajectory, with the *Lebel* extending to 330 yards, with the Belgian and German rifles to 435 and 545 yards, and further presumably with the new *Berthier* rifle.

The Continental experts are agreed that within this zone bullet wounds are of the gravest nature.

Bones are almost always crushed and splintered, the blood vessels lacerated, and nerve centres profoundly shocked.

Now Dr. Marsh's conclusions, though they appear opposite to all this, are not entirely so, for they are partly drawn from the effect produced by the accident on the *Aldershot* range, where a labouring man was hit through the thigh at a distance of 2,500 yards, and recovered from the effect of the wound in 24 days. This man was wounded at quite the far end of the zone of penetration, where the Continental experts I have quoted agree that wounds will be much less serious than before.

The second case on which Dr. Marsh bases his argument, is that of the *Woolwich* arsenal operative struck by a *Lee-*Metford** bullet fired from 100 yards behind him—the bullet passed completely through the upper end of the left thigh—the tissue destroyed was almost nil. No hemorrhage or shock resulted, and the man, though 51 years old, was discharged to duty in 32 days. This certainly looks bad, for according to the Continental theory this man was well within the zone of explosion, and ought to have received a most serious wound. I must ask you to bear this case in mind, while I read you an account of experiments which took place at *Allahabad* on two mules.

The experiments consisted of one volley by 3 marksmen at 200 yards (well within the Continental zone of explosion) at a mule which had been ordered to be destroyed, and a volley by the same men at 100 yards at a second mule with the *Lee-*Metford** rifle.

According to the continental experts and the result of the English experiments quoted by Dr. Godwin, these unfortunate mules ought to have been blown into small pieces. In the first case the mule was hit by all three bullets, but they were all a little far back, the only effect on the mule was that he kicked a good deal, but kept his legs (till destroyed). The progress of one of the bullets was traced. It entered the body about 10 inches behind the left shoulder, and about half-way down the barrel of the body, and was found to have drilled a clean hole through the body traversing the liver and other organs in its passage, and to have passed out the other side.

In the second case one bullet struck just in rear of the left shoulder, but about two inches above the heart. The other two bullets took effect a little more to the rear. All the bullets passed through the body and out at the other side. The mule was not apparently any more affected than in the first case.

The thickness of the present cupro-nickel covering of the Lee-Metford bullet is .016 near the base, but, as you can see from the specimen I have here, increases considerably towards the head, where it is .036. The thickness of the white metal covering of the Berthier is .02. The two rifles are almost precisely similar in other respects which affect the bullet.

The conclusions I have come to are, that what the Continental authorities call the zone of explosion did exist in the earlier forms of the small-bore rifle and bullet, when the twist of rifling was not so sharp, and a thick metal coat was in consequence not so necessary for the bullet to prevent shredding, and to ensure accurate shooting; but that there is no reason to suppose, so far as I can ascertain from results of later experiments, and the opinion of mechanical experts, that the zone of explosion can exist with the most modern forms of Continental bullets any more than with our own. It is probably the case, that when such a bullet at a short range strikes a large bone offering sufficient resistance to its great penetrative power to cause it to break up, the wound will be a very severe one.

Dr. Godwin's account of the result of experiments with the earlier form of the Lee-Metford bullet, and the nature of the wounds inflicted by (presumably) the Kropatchek repeater at short ranges in Portugal, as also the French experiments with the Lebel, seem to point to this. But where the modern bullet meets with only small bone, soft tissue, or muscle, it cannot possibly break up, and the result will be similar to those described in the Woolwich and Allahabad cases.

The nature of the wounds caused by the Männlicher in Chili bears out my argument.

So it comes to this, that stopping power has to some extent been lost to the gain of accurate flight, penetration, and range.

But we must not forget that with the Lee-Metford we are enabled to hurl double the number of bullets against a cavalry charge or a rush by savages, and that the trajectory of all these is twice as low as it was before, whilst the new powder will enable infantry to take accurate aim to the last, instead of being so enveloped in their own smoke after

the first few rounds of rapid fire, that the remainder of the shooting was often chance work. The value of this hail of lead poured in at a point-blank range with the perfect vision ensured by smokeless powder is much underrated, and I would go so far as to predict that it will compensate for the loss of stopping power to a much greater extent than is generally considered the case. Against savages too the great penetration of the modern bullet must not be lost sight of. Where men are massed together 4 or 5 will be wounded by the same bullet.

The old question, would you walk up to a tiger on foot with a .303, may well be answered, certainly not with one, but ten would probably stop him; and we may reckon, thank goodness, upon seeing charging cavalry or savages for a considerably longer time than the most confidential wounded tiger allows us.

But fire discipline must be of the best, and magazines must be full at the critical moment, or this enormous advantage is lost, and I grant that, failing good fire discipline, cavalry may well have every hope of riding down infantry, and the end of a charge by savages will probably be the point of the bayonet.

Only the next European war will settle this vexed question once and for ever. The war in Chili has gone far to prove, if proof were needed, the great superiority of the small-bore magazine rifle, both moral and physical, over the single-loader, when infantry is fighting infantry.

Should it be found that the infantry soldier can no longer depend upon fire to stop cavalry, one of two things must happen.

Either there must be a sacrifice of a certain amount of accuracy, range, and penetration, by decreasing the twist of rifling and metal coating of the bullet, thus re-establishing the breaking up or explosive effect at short ranges; or,

There must be a return to a larger bore and heavier bullet, involving the loss, so far as we know at present, of the flat trajectory, absence of recoil, and certainly lightness of ammunition, to say nothing of the loss of range and penetration.

It is a pity that the results of experiments officially made at home are kept so confidential as to make conclusions very difficult. If successful, they should surely be proclaimed to give confidence to our infantry in their new arm. If unsuccessful, we are all wrong and a remedy must be looked for. Unquestionably, however, the tendency is to smaller bores and increased velocities, and should the test of war not prove in the meanwhile that stopping power has been lost and nothing sufficient to compensate for it has been gained, the rifle of the future will probably be a .265, have a muzzle velocity of 2500 feet, and a point-blank range of 800 yards.

The Adjutant-General has been so good as to allow the foreign rifles from the Chungla Gully School to be sent here for exhibition, and I can therefore shew you four magazine rifles in addition to our own, viz. the Männlicher, the adopted Mauser, the Vetterli-Vitali, and the Gras, besides the single-loading Springfield, and Berdan rifle and carbine. I have also a specimen of cordite, and an ingenious invention called the breech adapter for miniature cartridges fitted for the Lee-Metford, which

should be valuable for the training of recruits and bad shots. These last have been kindly placed at our disposal by General Walker.

In addition to the authorities I have quoted in this lecture, I wish to acknowledge the assistance I have received in compiling Part I from a valuable paper on the subject by Captain R. C. Andrews, D. A. A. G. for musketry, which I heard read before the Secunderabad branch of the U. S. I. of India last September. The author kindly placed the manuscript at my disposal.

Colonel W. Hill, Officiating A. A. G. for Musketry: With reference to the rifle which will be issued within the next few months to the British troops in India, the rifle will be Mark I Star, with all the latest improvements, and not Mark I (which is now obsolete).

The lecturer thinks cordite is less regular in its action than the black pellet powder, but I have reason for believing that it is more regular, and has the further advantage of being smokeless.

Then, Captain Cox refers to the result of a rifle match between the Hythe School of Musketry using the Lee-Metford, and a team of Volunteers with the Martini-Henry, and because the Lee-Metford team won, he concludes that they fired with the more accurate rifle.

But this is a crude test of a rifle: a match of this sort depends more on the men behind the rifles, than on the rifles.

In average wind and weather, a good shot with the Martini-Henry will get better results with the shorter and heavier bullet of that rifle than he will with the very long bullet of the new rifle.

Some of the results of the issue of the new rifle will be as follows:—

- (a.) There will be a falling off of very good shots, partly due to the increased cost of ammunition for practice.
 - (b.) There will be no bad shots; a third class shot will be almost as extinct as the Dodo.
 - (c.) The individual shooting being so very much easier with a non-kicking rifle, the time and attention now bestowed on training bad shots will be available for tactics and the more advanced stages of musketry.
 - (d.) The general musketry efficiency of the army will be very much improved.
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The Proceedings terminated with a vote of thanks to the lecturer.

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Latest Ma-

Country.	Name of Rifle.	Weight.	Calibre.	Muzzle Velocity.	Sighting to	Position of Magazine.
		lbs. oz.		feet-p-sec.	yards.	
England* ...	Lee-Metford.,	9. 4.	·303	2000	2900	Central.
France* ...	Berthier.	9. 4.	·301	2073	...	do.
Germany ...	Model 1888.	8. 6.	·311	2050	2242	do.
Austria ...	Männlicher.	9. 10.	·315	1963	2125	do.
Italy† ...	Modified Männlicher. 91 pattern.	} 8. 4.	·265(?)	2300 (about)	...	do.
Russia† ...	...	9. 8.	·300	2000	...	do.
Switzerland ...	Schmidt-Rubin.	9. 10.	·295	2300 (about)	2187	do.
Belgium ...	Mauser 1888.	8. 2.	·301	1980	...	do.
Denmark ...	Krag Jörgensen.	9. 6.	·315	—	...	do.
Portugal ...	Kropatschek.	10. 0.	·315	—	2400	Tube.
Turkey* ...	New Mauser,	...	·301	—	...	Central.

* Armament not complete.

† Armament not begun.

gazine Rifles.

Number of rounds in Ma- gazine.	Cartridges in filers or clips.	Cut off.	Weight of Bullet.	Covering of Bullet.	Bolt Action.	Twist of rifling.
			grs.			inches.
10	No.	Yes.	215	Cupro-Nickel.	Rotary	1 in 10 (or 33 calibres.)
4	Yes.	Yes.	216	Maillechort.	do.	1 in 9.45.
5	Yes.	No.	223	Plated Steel.	do.	1 in 9.44.
5	Yes.	No.	242	Steel.	Straight	1 in 68½ (calibres.)
5	Yes.	No.	...	...	Rotary	...
5	Yes.	No.	215	Plated Steel.	Rotary	...
12	Yes.	Yes.	211	Plated Steel (?)	Straight.	1 in 10.55.
5	Yes.	No.	219	Nickel.	Rotary	...
5	Yes.	...	...	...	...	...
8	No.	Yes.	...	...	...	1 in 50 (calibres.)
5	Yes.	No.	...	...	Rotary	...



THE MOST EFFECTIVE TACTICAL USE WHICH CAN BE
MADE, ON A MODERN BATTLE-FIELD,

(a).—Of the light entrenching tool ;

(b).—Of signalling.

FIRST ESSAY,

By Captain W. D. THOMSON, 1st Bengal Cavalry.

“ Heaven’s Light our Guide.”

When writing on a tactical subject given by the United Service Institution of India, it seems reasonable to treat the subject from two different points of view, viz.—(a) From a point taking into consideration modern European tactics as developed in the last great European wars, and also the probable changes which will be introduced by later inventions, such as smokeless powder &c.—(b) From a point more suited to the tactics which may with advantage be employed against savage tribes, when we can depend on our small, well armed, and well organised armies being opposed by levies which though perhaps as brave, and probably much more numerous, from want of arms and from tactical inefficiency may be attacked and taken liberties with, which no one could take with equally well armed and organised troops belonging to European powers. In a battle against the former the ordinary text book rules of tactics may be accepted, and the Prize Essay subject considered with reference to them. In dealing with the latter the fundamental tactical rules must be to attack the enemy whenever and wherever found, and to use our superior arms and rapidity of actual manœuvring in the field to gain a flank or seize some important point with a view to bring the matter to an immediate issue. The former may be said to be the field of greater tactics or tactics of large masses, such as the flank movement of the Saxon army corps on the 18th August 1870, and the latter of lesser or individual tactics, when by individual is meant small bodies such as squadrons, batteries, or battalions, and not of individual men.

As no theories or conclusions can be of any value except such as have originated in, and been founded on, the experience of late wars, it will be as well to consider the use made of the light entrenching tool in each of the three great wars which have lately taken place, in which the entrenching tool was used at all on the battle-field, and, this done, endeavour to make deductions from these as to the most effective use which can be made of the spade in a modern battle-field.

To take them in chronological order. The first is the American civil war. This was throughout to a great extent a war of the attack and defence of entrenched positions, but it is doubtful whether they were of such a nature, that the light entrenching tool could have been advantageously employed. The defences on both sides were either large works, or breast works of logs and timber, in making either of which large spades and axes would have been most suitable, and even when they both were largely employed, as at Fredericksburg by the Confe-

derates, the necessity for a portable entrenching tool never seems to have struck anyone. These works were undeniably valuable, but more in the way that the large redoubts at Plevna were, to enable a small number of partially trained troops to resist a much larger number of troops, whom they knew were not highly enough trained to be handled with much precision, and who would be hurled at them in successive waves regardless of loss, until they either carried the position, or no more men could be induced to advance. We can hardly expect from this war many ideas for the tactical use of a light spade on a modern battle-field.

The large spade-works round Richmond and Vicksburg were of the same nature as those made by Todleben round Sevastopol, and were such as could be more advantageously made with a large sapper spade than with a light entrenching tool.

To take the next war in chronological order. In the Franco-Prussian war entrenchments on the battle-field, with the exception of the investment works round Metz and Paris, were used only by the French. We can find no single instance of the Germans using them. The French undoubtedly strengthened their position at Gravelotte by shelter trenches and rifle pits, and the Germans found the position too strong to carry by front attack. Until late in the evening they had made little or no impression on it, until the day was decided by the turning movement of the Royal Saxons, but they attribute this to the natural strength of the position, and not to the artificial strengthening of it by spade work. They never seem to have dreamt of burdening the already heavily laden soldier with a spade, until after the Russo-Turkish war, and even now, when we consult the latest obtainable German book on tactics, von Goltz', "Nation in Arms," we find the subject of field fortifications dismissed in a few lines. Only one suggestion is made for the possible use of a spade, viz., on the defensive-offensive. A corps told off to make a feint against the front of an enemy might advance and entrench itself on ground won to let the flanking movement do its part unobserved. He winds up with the story of a Prussian Grenadier, who, after the capture of a strong work at the battle of Orleans, which had been made the special target of the German artillery, and which was full of the corpses of the defenders, said to the dead bodies "Don't you see that these scratchings are of no use."

To proceed to the Russo-Turkish war. Here under somewhat peculiar circumstances, the use of the spade received an impetus such as has never before been known. Greene says in his book, that the war became one of the defence and attack of positions fortified in the face of the enemy. The Turks entrenched themselves on all occasions. At Plevna, Lovtcha, Gorni Dubniak, in the Shipka pass, and all the other disputed passes of the Balkans, and finally at the Buyuk Tcheknadje lines before Constantinople. The Russians entrenched themselves before Plevna after the second assault, at Lovtcha, in the Shipka Pass, and generally whenever they expected to be attacked. In this war we first find men carrying spades on their backs as part of their marching and fighting equipment. Skobelev's corps carried a full sized spade per

man over the Balkans in the deep snow, and such was their belief in it, that when asked before Constantinople what they thought of the new light Linneman spade, they said—"They will do very well for soup spoons." From this war dates the issue of the light spade as an inherent part of the soldier's marching order kit.

The merits and defects of this spade are rather outside the scope of this Essay, but all experience seems to show, that the light spade, though very portable, and though in an emergency it can be used for all kinds of spade work, is indisputably most suitable for hasty work such as shelter trenches, rifle pits &c., and not for any work with a large profile such as a redoubt; as in the latter the small size of the spade makes the work of throwing earth to any height more laborious. It is essentially a shelter trench spade, to be used to throw up cover, urgently required within a very short time, by troops who would be crushed by fire if left unsheltered in the open. For redoubts &c., the sapper spade is better. This at once gives us a clue to the true tactical use of the light spade, viz. for shelter trenches, rifle pits &c.; in fact all such strictly hasty entrenchments as must be made either under fire of the enemy, or in such haste as to preclude the possibility of the sapper spade being brought into use.

The consideration of the historical aspect of the use of the spade brings home to us the different objects, with which field entrenchments were used formerly and now. Formerly the spade was used to raise an obstacle to the direct rush of the enemy using shock tactics, and to break their formation. In these days it is used to make shelter for troops who would otherwise be crushed by fire from a distance, and whose morale remains comparatively unshaken, if they can be provided with a shelter which will to a certain extent shield them from the direct hail of the enemy's fire, while at the same time it does not prevent them firing in return.

The Romans entrenched their camps to enable the camp guards to withstand the first direct rush of an enemy in the night, until the troops had fallen in and the confusion of a night alarm was over. The English at Crécy planted stakes in front of their archers to stop the rush of the French men-at-arms, who might otherwise have carried everything before them.

This remained unaltered up to the introduction of breech-loading arms, since which time we nowhere find any instance in an European war of troops managing to reach an entrenchment in any force and being repulsed by the bayonet.

When Skobelev's troops reached the centre redoubt of the Krishin group on the third assault on Plevna, they had no difficulty in getting in, the difficulty was in staying in when exposed to the fire of the redoubts on the flanks, and of the fire from the town of Plevna.

The redoubt itself proved no obstacle, but as it had no curtain, they were unable to remain there, even though they strove desperately to make good this deficiency with their bayonets and soup dishes. The repeated failures before Plevna made such an impression on the

Russians, that Skobelev made each of his men carry a full sized spade for the rest of the war, including the passage of the Balkans in deep snow, though we nowhere read that they used it, as the only piece of fighting they subsequently had was at the Shenovo redoubts, when he carried the strongly entrenched Turkish position by the use of successive lines marched against the position and well supported.

From the time of Lovtcha and Plevna arose the strange notion which was afloat soon after, that to carry an entrenched position it was necessary for the attacker to stop and entrench himself when a certain amount of ground had been gained, in order to crush from these entrenchments the fire of the enemy. This idea apparently arose from the Lovtcha attack. From this time for the first time arose the question of the use of entrenchments in the offensive. The Russian army has not apparently to this day shaken itself clear of this idea, although Skobelev himself disproved the necessity of it at Shenovo, when he took the redoubts with bands playing and colours flying, without any counter-entrenchments or even any artillery preparation of the attack, as he had no guns with him.

It is curious to note the different impressions on this subject made on the German and Russian nations by their experience in their most recent wars. The latest German authorities almost ignore hasty entrenchments, and in a book on war of many hundred pages, only give about one page to them, evidently considering that all but the most solid redoubts with bomb-proof head cover, such as would hardly be made by the light spade, are merely shell traps. The immense penetration of the modern rifle emphasises this. The modern rifle with its new powder has literally twice the penetration of the chas-epôt and needlegun, and cover that 20 years ago would have been considered bomb-proof is now hardly musket-proof, and so the difficulty of creating adequate entrenchments in a hurry with the light entrenching tool is doubled, and it is borne upon us that the chances of overcoming this difficulty are so small, that it is quite an open question whether it is any use burdening an army with it, as there would be no hope of being able to make sufficiently thick entrenchments to be of any use, during a pause in the attack, and in the defence the thick entrenchments now required would be better made by the sapper spade.

The Russians, on the other hand, attach such importance to hasty entrenchments, they have an official manual for the use of the spade, in which the soldier is instructed how he should on having carried or partially carried a position, throw himself down on his side, and begin each man to dig a hole, throwing the earth in front of his head, so as to get head cover rapidly, then to turn round on the other side and enlarge the hole, and so gradually make himself a shelter pit, in which he is certainly most safe, but from which one would think it would be very difficult to get him to move. This is evidently the teaching of the Lovtcha successful attack, and of the unsuccessful attempt to stay in the captured redoubt at Plevna, especially of the former. The writer best known in England on the Russo-Turkish war does not hesitate to say that in future the spade will be as important as the rifle. How

different a conclusion from that of the previously quoted German grenadier!

To summarize, it is difficult to resist the impression that in the future as in the past, the spade will be used almost entirely in the defensive. In cases where the attackers use it, it will only be when a position already gained has to be held, as in the case of the centre redoubt at Plevna; or when a false attack is being made to cover a flank attack or an attack on some other part of the line, and the enemy being deceived by it, has committed himself to a strong offensive return. The false attack must then probably make an effort to entrench itself, and hold out to the last, to allow the other attack to develop. In this case, as in the case of the captured redoubt at Plevna, the offensive becomes the temporary defensive, and so the rule is not broken.

A third conceivable case is when a hastily fortified place like Lovtcha has to be taken. This was an open town defended by successive lines of hastily made redoubts, which, however, had no head cover, (in this respect, as also in the fact that the ground favoured the approach of the Russian troops, differing from Plevna), in the attack on which Skoleff stormed ridge after ridge, and as he carried each ridge made shelter trenches for the infantry and epaulements for the guns, from which he crushed the fire, and broke the morale of the defenders of the next line of redoubts, until at last the town itself was carried by assault. To this action we can trace the idea of the use of entrenchments on the offensive, and even in this case it is doubtful whether these tactics would have succeeded, if the defenders had had bomb-proof head cover as they had at Plevna; the redoubts of which place the Russians shelled with practically no effect either on the works or on the morale of the defenders. The redoubts, however, were not such as could have been made with the light entrenching tools.

It is evident that much the same process is being gone through that led, first, to the use of personal defensive armour, and next, to the disuse of it. When projectile weapons were in a stage in which they were fatal to unarmed men, but comparatively innocuous against men encased in armour of proof, men willingly put up with the weight of armour which would protect them from projectiles, but when it became evident that no armour would keep out a bullet, it was gradually left off.

At the time of the Russo-Turkish war men gladly burdened themselves with a spade, because they were confident that they could with it in a very short time make cover for themselves which would keep out a bullet, but now when all the military nations of Europe are armed with a rifle which will kill a man through a moderately thick brick wall, it becomes a question whether it would not be better to give up all idea of rapid entrenchment, and trust to the increase of marching power given by the abolition of the spade as part of the marching order kit, being as much to gain a battle or decide a campaign as the partial shelter gained by a hasty entrenchment.

When considering the actual tactical rules for the trace &c., of the hasty entrenchments most suitably made by the light entrenching tool, we must remember that these works will be made by infantry, and

therefore only such works must be designed as can be made by the infantry spade, all complicated ones being avoided.

The next consideration in the nature of works which can be made is the placing of these works.

In every position there are certain points which exercise a predominant effect on the course of the fight. These "tactical points d'appui," as they are called, should be made as strong as possible.

First with reference to the kind of work which can be made by the infantry spade. They may be roughly said to be (a) Shelter for the extended line and supports. (b) Minor works such as smoothing and clearing the field of fire, and putting the inequalities and natural features of the ground into a defensible state.

These may be generally said to be such works as isolated fractions of troops have to make on their own account as parts of the line of battle. Every other kind of work is not for infantry, but for specially trained troops.

The rules for choosing the most favourable positions for shelter trenches are in every text book. They may be summarised as follow:—

Such places should be chosen, as will give the clearest field in front, combined with fairly good country to retire over behind it. Not necessarily at the highest point of a rise.

The trenches must be roughly at right angles to the expected front of attack.

They must be echeloned to allow of cavalry and artillery to pass through them.

They should not be enfiladed at any point if it can be avoided.

The officer detailed to make any kind of rapid field fortification must keep the following conditions before his eyes.

1st.—To get sufficient cover according to the nature of the projectiles, which will be used against it.

2nd.—To execute the work in the shortest possible time (this is the essence of field fortification), taking into consideration the elements as fellow-workers or hinderers, and the resources in tools at his disposal, and the fact that inexperienced workmen find more difficulty in throwing earth high than in throwing it far. So it is better to make a broad shallow ditch than the old narrow deep one. The work is for fire and shelter, and not for an obstacle.

3rd.—Make them so that works originally slight can be improved as time offers.

4th.—Make them as little noticeable as possible.

5th.—Avoid scattering your guns all about, as it is easier to make one long work for many guns, than too many small ones for guns scattered along the line of fire.

It is of little use attempting to enter on long dissertations on the theoretical conditions of the positions of improvised fortifications, but all officers should be theoretically trained enough to be able to fix on approximately the best position for the works and the best system of works to be undertaken; and the men enough to be able to execute them without undue exhaustion.

To turn to the subject of fortifications used against undisciplined levies and savage tribes.

They are required for the same purpose as all entrenchments were before the introduction of breech-loading arms, viz., not so much for cover from projectiles as for obstacles to a surprise or sudden rush of an enemy, who finding himself unable to contend with superior troops on the field of battle, devotes himself to night attacks, attacks on posts on the line of communications, and guerilla warfare.

They could be used with advantage by a small force actually surrounded by a numerous enemy, to enable it to hold out until relieved, or until an opportunity for a sortie occurs; or as a breastwork for an outlying picket, to prevent its being carried by a rush in the night, or generally for purposes similar to those employed by the Romans who regularly entrenched their camps, but trusted to their discipline and superior tactical skill to gain them the victory in the open field. This must be the only kind of fortification used by our army against a savage enemy, as any other would deprive us of the moral advantage gained by the initiative, which can never without loss of prestige be allowed to be gained by the enemy (except in case of hopelessly overwhelming odds), when this enemy is a partially trained and badly armed one such as we habitually meet in India.

It will be at once seen, that for these purposes it is not imperatively necessary to have a light entrenching tool at all, and the case is better met by arrangements being made for a proportion of large spades and picks being carried on pack animals or light carts with the troops.

We have now to treat the second heading of the subject.

In the same way as before, the use of visual signalling in war will be considered from a historical point of view to begin with, and deductions will be drawn.

(a).—As regards modern European warfare.

(b).—As regards modern savage warfare.

But before beginning this, the great difference in the use of signalling in different parts of the world may be considered.

As the climate of the country in which war is being carried on is an important factor in deciding whether the soldier shall be made to carry a spade or not, so the climate of the country must largely decide whether the signalling must be by flag or helio. In Europe cloudy skies and uncertain weather make it always uncertain whether a heliograph can be used, and so a General can only calculate on flag signalling which is visible only for a few miles at the most.

In India steady sun for ten months in the year makes it certain, that if certain commanding points can be reached the heliograph can be used on them, provided that the flash is not defiladed by any obstacle which has not been taken into account. The helio flash can be seen to a certainty for 20 or 30 miles, and has this advantage, that the further off the receiver is, the wider the lateral space over which the flash is visible, so that it is comparatively easy to attract the attention of a distant point, even though the exact position of it is not known, as the flash, if in anything like the right direction, is seen at once and

the return helio aimed at it, whereas if it were near, a most accurate aim would be required, or the flash would not be broad enough to be seen.

Any one who has tried to get communication on service knows that the difficulty and delay is nearly always caused by some small unnoticed shoulder or spur which has defiladed the last station (not from weakness of light or bad aim), and apparently made your compass bearing, previously taken from the last station, wrong, the complement of which you now hope to use in finding your last post. It is needless to say, that without this compass bearing, the last post will be hard to find in a country which is a jumble of hills which all look exactly alike, and quite different to what they did from the other side. Thus by helio an unequalled means of communication is obtained between widely separated columns in partially explored country.

At the same time it is equally available with the flag for use in minor tactical movements. This gives us a clue to the different kinds of visual signalling required in Europe and in the tropics, viz. In Europe, the flag. In the Tropics, the helio.

To begin the historical précis. If naval signalling is excluded, the first occasion on which hear of signalling in connection with a battle-field was on the line of communications, when a line of semaphores brought to the National Assembly in Paris the news of the battle of Fleurus. Semaphores were frequently used in the Napoleonic wars, but always on the line of communications. Signals used to help the tactical combinations of columns during flank marches &c, being until quite lately generally oral ones, such as firing a salvo when a turning movement had been completed, or some such rough arrangement as burning a village to show the force had reached a certain point. In none of the later great wars was visual signalling used, except in fortress warfare, and even now it is nearly ignored by the latest German and French tactical writers. Von Goltz in his much quoted "Nation in arms" says that all methods of visual signalling are unreliable, and relegates the use of flags and "mirror telegraph," as he calls the heliograph, to fortress warfare. This is quite to be understood when it is remembered that the cloudy skies of Europe restrict the signallers to the use of the flag, which is a most unreliable medium for transmission of orders in large operations at great distances.

It was not used in the Russo-Turkish war, and it was reserved for the English army to develop its use in the Zulu and Affghan wars. In Zululand it came in fortress warfare and line of communications; Fort Ekowe when completely invested by the Zulu Impis was in steady heliographic communication with the relieving force long before it was relieved.

In Afghanistan the fullest use was made of signalling which has yet been seen in war. It was largely used on the line of communications, and many instances occurred of the tactics of a combat being modified by it during the actual course of the action.

General Soboleff in his "Anglo Affghan Struggle" mentions, that at the taking of the Peiwar Kotal the flank column kept itself in com-

munication with the front attack by means of the heliograph, and indicated by it to the latter the time to begin a simultaneous attack. He also mentions the fact of General Roberts, when directing the action of Charasiab from the reserve, being kept informed by means of heliographs of the movements of the different attacking columns, and making his dispositions accordingly.

For the purposes of the present Essay, it would be useless to recapitulate any of the signalling arrangements made on the line of communications, which, however, were very complete, and worked with very little hitch. But the study of the despatches of the war will give us a good many instances of signalling being successfully used on the actual field; amongst others, the following may be quoted. During the movements carried out near Cabul by Generals McPherson and Baker, communication was regularly kept up between the attacking columns by heliograph during the advance. (Of this more hereafter).*

On the 23rd April 1880, General Palliser with the advanced guard of General Stewart's force, after the battle of Ahmed Kheyl came in collision with the enemy, and sent back a request by heliograph for reinforcements. General Stewart sent to him the 59th Foot and 3rd Ghorkas, and General Palliser with the help of these succeeded in dispersing the enemy.

Since that war signalling has been most successfully used in all our frontier expeditions, in which its use came in at the repeated communications established between two columns making towards a certain point from different bases. Without it either flying columns would have had to be sent to get touch with the other column, or the news would have had to be sent back to the base, and thence wired round to the base of the other column, and thence up. But when heliographic communication has been established, the converging movement can be completed with certainty, and the mind of the General is relieved of the doubt as to whether he will find himself unsupported before an enemy probably strongly posted in a difficult and unexplored country. In all these expeditions, however, signalling, though it has proved itself invaluable in the strategical movements, has not been required to be called into use as an actual tactical adjunct. For examples of this we have invariably to turn to the Afghan war.

With this closes the historical précis. Before we can draw any deduction as to what its probable best use will be in European warfare, we must picture to ourselves what a modern battle-field will probably be like in the opinion of the best and most authoritative writers.

"The small controlling power of the highest commanders as to when the tactical decision shall arise, is a particularly difficult element in modern warfare. The best intentions of the Commander-in-Chief are often baffled and his computations brought to naught."

"Owing to the fact that the masses of troops on the march must spread themselves in great breadth, the number of opportunities for an actual collision of certain parts with the enemy increases. Whenever a

* Captain Straton's report.

battle results therefrom, the troops rush from both sides to help. An issue takes place at a spot where it is not wanted, at a side when it is not expected. It therefore comes to pass that just in respect of what is most important in war in regard to both action and battle, the supreme command is least of all free, and most of all dependent on a foreign will, namely accident."

"Almost regularly in this respect will it have to deal, with "*faits accomplis*", and find the battle already too far advanced when it first receives news of it."

"In these days it is seldom possible to find a point of view whence the whole battle-field can be surveyed, at all events it is too large for it to be possible to make personal dispositions of the troops forming the wings. The orders carried by a fast orderly take so much time to transmit, that the circumstances under which they were issued have in the meantime completely changed. Intelligence and messages come from different parts of the field in a confused state, and are contradictory. The General must ordinarily act on hearsay, and this requires more courage of responsibility than was required fifty or one hundred years ago."

"In former days the possibility of unexpected and colliding influences on the part of subordinate commanders was more limited. An army formerly advanced before the battle to a distance from the enemy that in these days would be equivalent to standing under heavy fire. The General could see for himself how matters stood."*

"Rapidity and continuity of motion are the essence of the attack."

From these extracts it will be seen that the great difficulty in modern battles is for the Commander-in-Chief to secure any tactical initiative, or to be able to make with confidence any combinations during the actual course of the battle. Any means of carrying news rapidly and correctly would be welcome.

As an instance of the experiments made in this direction, it may be mentioned, that during the last French manœuvres between the Seine and the Marne, we hear of General Davoust stationing himself in a captive balloon joined by telegraph to the different field telegraphs, hoping that by using the bird's-eye view thus obtained, he might be able to make the necessary tactical combinations. Of course the ideal way of doing this would be by the field telegraph accompanying the march of the columns. This is possible in sieges and strategical movements, but the rapid kaleidoscopic changes of a battle-field preclude its use in the front of a battle.

The only way of replacing it would be by some means of visual signalling. Before going into any dissertation on the use of signalling on an actual field of battle, the different kinds of battles on which it may be used will be specified, viz.

(a.)—The premeditated offensive battle. *Instance.* The German attack at Gravelotte.

* Von der Goltz.

(b.)—The unpremeditated offensive or defensive battle. *Instance.* Spieheren, Colombey, Mars la Tour.

(c.)—The premeditated defensive battle. *Instance.* The French at Gravelotte and Sedan.

For rapid and reliable signalling it is indispensable that the point to which the news is to be sent should be a more or less fixed or stationary one. If a party of signallers accompanies the fighting line, they would invariably demand that the point to which any news was to be sent should be a fixed one. They, even after having advanced a considerable way, would have every chance of picking up communication rapidly with a party whose position they already knew, but if they had every time to spend some minutes or perhaps a quarter or half an hour in waving a flag, to attract the attention of a party which was at that time occupied in moving to another position, it would be quicker to send the message by orderly. "Rapidity and continuity of motion are the elements of the attack." So we see at once how difficult it would be to use flag signalling between two large columns marching at an interval of several miles to attack a position. In this case both the signalling bases would be moving, and there would be no certainty of ever picking up communication at all; at the same time the General would perhaps have delayed sending an orderly in the hopes of saving time and horse-flesh, should the communication be picked up by flag.

But this difficulty does not come in in a premeditated battle, in the case of communications between each column and the Commander-in-Chief, who is probably with the reserve. A place could be easily fixed, and was almost invariably in the Franco-German war, and orders given that the Commander-in-Chief would be found there. This would give a definite permanent base, and fixed signalling posts could by officers accustomed to it be easily be made to the points where the columns would deploy. This would leave only one post a shifting one viz., the one which accompanies the deployment. This would know the position of the last post, and the men in the latter (these last two posts should be at least double as strong as the others) would be watching a large arc of the horizon for the wave of a flag or flash of a helio used as a call-up signal.

From here the transmission to the Commander-in-Chief would be rapid and safe. Even if the General did not care to trust to the flying post picking up the last fixed post, he could send an orderly to it, and thence the flag would send a message on much faster than an orderly, and the Commander-in-Chief, being thus rapidly and to a certain extent simultaneously informed, would have a chance of making some tactical combinations. At first glance it would seem as if an arrangement of signalling would be particularly well suited to help in the turning of a flank march and a simultaneous attack in front and flank, but here the difficulties are really great. A flank march in these days, to be successful, must be made at a considerable distance from the enemy's front, and a long circuit must be made.

The XII corps on the 13th August 1870 started at day-break and completed the flank movement at 7 P.M. This would mean, either a

great many parties of signallers, or the parties being at such a distance that flag signalling would be difficult. The line of signallers would be parallel to the enemy's front instead of at right angles to it, and would be very exposed both to the enemy's view and fire, and easily interrupted. It would in fact be a very long weak line, with many transmitting stations, and each transmitting station a source of weakness inaccuracy and delay. This of course only refers to European warfare, where the uncertain sun makes us depend on the flag. In the tropics a heliograph is an ideal instrument for timing a flank march and simultaneous attack, as its long reach does away with the elements of weakness and error which are so evident in the flag line. It is apparently only by some such arrangement as this, that even in a premeditated battle, the Commander-in-Chief can, once the general orders for the battle have been given, and the different corps have committed themselves to the movement, exercise any tactical control over the events of the day. In an unpremeditated one the matter is even harder. Probably the head-quarters of the Commander-in-Chief will be on the move, and signalling communication with him could not be managed at all. The most that could be done would be for the signalling officers to try and fix a general base, where the nearest senior General is, and to try from there to form different lines to different corps fighting, but as the General in command is always liable to be superseded, probably most Generals finding themselves suddenly entangled in a battle, would prefer to use an orderly, as there would be no certainty of their reports and orders being delivered by flag.

Undoubtedly it will be the side which acts on the defensive, which will be able to make the most intelligent use of signalling. Here, until the time for a counter-attack comes, there is no moving of corps. The General in command of each corps can fix his own head-quarters, and arrange for signalling from there to the fighting line and back towards the head-quarters of the Commander-in-Chief. He can with tolerable certainty communicate with the General who has under him the neighbouring section of the defence. He can keep the Commander-in-Chief steadily informed of what is going on in his front, and can get orders from him about the movements of his command. To an officer accustomed to look at a country from a signaller's point of view, the French position at Gravelotte is a singularly easy one to connect through out by signalling. The commanding points are all on the side of the French, and orders on a battle-field 12 miles long, which would have taken an orderly an hour to deliver, could be sent easily in 10 minutes to all parts of the field. The position of the various corps was unchanged from day break to 7 p. m. There would have been no difficulty with such signalling arrangements, as would now be used, in the Commander-in-Chief keeping in touch with every part of his line of battle.

If the French position at Gravelotte was a good one for signalling, that at Sedan was an almost ideal one. The battle-field consisted of two rings of hills, the inner and smaller ring held by the French, who were surrounded by the Germans on the outer ring. In the centre is the town of Sedan. It is visible from nearly every point of the

French defensive line, except from the N. E. edge of the Bois de la Garenne. Standing on the Calvary of Illy, you can see the whole of the line W. to Floing, and also can see past the Bois de la Garenne to the height above Givonne held by General Ducrot's corps. From this place lateral signalling communication could be made with very little danger or difficulty, as far as the heights above Bazeilles. A Commander-in-Chief posted near the N. E. of the town would have had little difficulty in knowing what was going on on all sides every half hour. Marshal McMahon was wounded, however, when riding to La Moncelle to try and find out what was happening, as he was apparently in the dark.

To summarize, it is evident in European warfare, that signalling could be used with great effect in premeditated defensive battles, and with good arrangements and good luck, in premeditated offensive battles between the columns and the reserve. The expression good luck is used, as no one knows better than a signalling officer who has tried it, how uncertain signalling communication is when attempted in a hurry. It is then no faster than mounted orderly, though if only a very small opportunity is given of correcting hurriedly and badly chosen positions, and of letting the posts settle down a little, messages would go 10 miles to the rear to the Commander-in-Chief at six words a minute at least, and messages of 24 words would reach him in about ten minutes as against an hour by mounted orderly, an incalculable gain. It is, however, the element of uncertainty in the forming the line at the first effort, that would make it unreliable in an unpremeditated battle, in which the General would probably prefer to use an orderly.

But if it is uncertain for large tactical bodies in this case, its value as an adjunct in the smaller tactical movements is great.

This brings us to the question of the use of signalling by small tactical bodies. It can apparently be much used in the movements of a brigade or regiment forming for attack, when it would be a rapid, and in these days of smokeless powder, a fairly certain way of communicating between successive lines of troops which are being sent at a position, and facilitate the well timed reinforcement of the fighting line by successive waves of fresh troops, to which reinforcement Skobelev attributed his success in reaching the redoubts at Plevna and in carrying the line of redoubts at Shenovo. Here, however, the element of uncertainty comes in to a large extent, inasmuch as the signallers are much more likely to be shot than those merely sending reports behind the battle. Readers of the United Service Institution proceedings will remember the graphic picture given by a well known writer to it, in a lecture on the reorganisation of the native army, of a commanding officer of a battalion with his orderlies and his signaller shot, and utterly unable to make himself heard or get any of his orders carried, and obliged to leave the conduct of the attack to the company commanders.

There is, however, a great opening for signalling on the field of battle in the working of the cavalry division. This is no new idea with cavalry. Probably the first instance of visual signalling on the battlefield is what we read of Seidlitz at Rossbach and Zorndorf, riding up close to the enemy's line (in the one case marching to a flank, and in

the other rushing to overwhelm the broken Russian infantry), and when he saw the opportune moment for a charge, giving the signal to his Brigadiers to move up to him by tossing his meerschauum pipe up on the horizon. Before drawing any deduction as to how a cavalry general could utilize signalling on the field of battle, it would be as well to see what most authoritative writers consider will be the conditions under which great cavalry movements and charges will be made.

"The cavalry general must hurry back to his squadrons and bring them into action. Valuable time is lost and the favourable moment may pass away. Seidlitz, Ziethen, Drieson, Gessler were able to keep their squadrons in readiness within 800 yards of the enemy, to ride up in person to one half that distance, survey the enemy as in these days an infantry brigade at drill is inspected; discern the moment when the line has begun to waver, and then throw their force upon them."*

In these days when the field of fire is so much greater, all authorities agree that cavalry must be kept about a mile away from the actual spot where the fight is raging, as being any nearer would bring their heavy masses under aimed fire of infantry when motionless. It will thus also be kept free from the tension on the nerves, which must and does oppress infantry kept for nearly two miles advancing under heavy shrapnel and magazine fire. This zone can only be crossed slowly and painfully by infantry, and the passage would probably take $\frac{3}{4}$ of an hour; whereas the mobility and speed of cavalry advancing at the trot and gallop would take them over the same distance in ten minutes.

If the cavalry had been massed on the flank, it is very probable that the enemy fully occupied with the front line of the infantry, would allow the cavalry to come up to within a mile without noticing it, as has been proved to be the case with the reserves of the infantry attack, who have been known to pass with little loss over the very spot which had cost the first line the most, as the attention of the enemy was fixed on the first line.

This rapidity of passage of the cavalry would give it many chances, if massed on a flank and directed by a man possessed of nerve and natural "coup-d'oeil," of throwing itself on the masses of much-suffering and hyper-excited infantry, clinging with difficulty to a strongly attacked position. To effect this we must have not only thoroughly trained cavalry with a competent leader, but that leader must leave his squadrons and ride comparatively close up to the battle, and watch the changing features of the day. We hear that Seidlitz and Ziethen used to ride up to within 400 yards, leaving the men at 800 yards. Probably now the leader would have to stop at 800 yards, leaving his men another 800 yards behind him. This is necessary as no amount of natural "coup-d'oeil" would avail him, if he were to stay so far off that he cannot see the progress of the battle. Probably in these days of good field glasses and smokeless powder, a general could see as well at 800 yards as Seidlitz could with his own eyes through the smoke of ordinary powder at 400 yards, but the question is how to utilise the favourable moment when

* Von der Goltz.

seen. The General cannot ride back 800 yards to the cavalry division massed in rendezvous formation behind a wood or ridge, as it takes some time (2 or 3 minutes), and he would lose sight of the situation. Seidlitz' pipe signal could not have been seen at 800 yards, even from the top of the Jans-Hugel at Rossbach. How to get the mass in motion at once in the required direction? With a few smart signallers with the Divisional General and with each Brigadier, the former could ride up, choose the time and direction of the attack, and signal some few words back, such as for instance, "Preparatory formation and move to E. of village on your front." This, if all messages were indicator messages, and no time was lost in sending "from so and so" to "so and so," and if suitable and very necessary abbreviations were used, would be sent in two minutes. The General would find his division coming up to him in suitable formation, without his having to take his eye off the action until his troops were actually at his disposal. Without some such arrangement it is difficult to conceive how a Cavalry General could keep his eye on the battle, and at the same time keep his squadrons fresh and in good condition ready for a supreme effort.

With reference to the despatch of orders between different parts of a cavalry division, some rapid system is required. We saw on many occasions at Muridki camp, orderly officers having to ride long distances to deliver small messages which a few waves of a flag would have done. One instance in particular comes to mind. It was towards the end when all the regiments had joined. The first line had been reinforced, until there were 20 squadrons in it, and was galloping to attack an enemy represented by flags. The Brigadier noticed that in the direction in which his line was going the enemy (i.e., the flags) would slightly out-flank him, and wanting to take ground to the right and at the same time move to the front, he sent orderly officers to order "troops half right." Some who were sent to the regiments at the end of the line galloped half a mile and back again, to order a movement which was completed before the orderly officer had returned, as the General had sounded "Forward" on the Bugle. There is no sound for troops half right, and the multiplication of bugle sounds on parade would lead to hopeless confusion, but if the General had had with him a couple of signallers, and each Brigadier the same, all trained in a system of abbreviations such as is most successfully worked in "The Bays," an "indicator" signal and three letters "T. H. R." would have answered all the purpose which it required a gallopper a spin of a mile there and back to do. In the same way simple abbreviations for "rendezvous formations," "attack formation," "preparatory formation," and many other continually recurring orders could be easily worked, and would save orderly officers miles of gallopping, and would leave them and their horses fit for work when some urgent message has to be sent. To carry out this system, it is evident that every cavalry officer should know a little signalling just as they are now supposed to know trumpet sounds. There would not be the same difficulty as with trumpet sounds as no musical ear is required, only fair eyesight, which should be a "sine qua non" with all cavalry officers, and the knowledge of the morse alphabet on the flag.

In the same way an artillery commanding officer riding out to choose a position could signal back a few abbreviated orders, instead of sending his trumpeter back with the order to move up.

It is, however, in war against savage tribes that signalling has been most successfully used as yet. In all tropical climates there are fixed seasons, and it is quite certain that for nine months in the year the heliograph signal will be visible. During the rains heavy mists and clouds make heliograph signalling impossible, and flag signalling precarious. As in European war so in Asiatic, it will be found that a fixed base is almost a *sine qua non* in signalling on the battle-field, but as the heliograph is a much more powerful and more widely seen instrument than a flag, it might with a certain amount of arrangement and good fortune be used as a communication between columns in the actual attack. The method used would probably be the same as the communication between two parallel squadrons in the systematic reconnaissance of a regiment covering eight or nine miles of country. Here two squadron leaders, after consulting and comparing maps, agree that signalling parties will be sent to certain prominent heights which are in their respective lines of advance, and will stay there so many hours in the hope of picking up communication.

We find in the report on signalling in Afghanistan, that during General MacPherson's and General Baker's operations mentioned before, communication was kept up in this way most successfully during the advance, but during the actual combat it failed.

"Communication with right attack on Conical hill maintained, but owing to no signalling station accompanying main attack on Asmai heights, an order to recall from that attack was not received from the officer commanding until too late to afford assistance to the party on the Conical Hill."* This perfectly illustrates the difficulties of communicating for certain by heliograph, when two columns are both advancing but it is undoubtedly much easier than in European warfare, as there is much less chance of a casual collision bringing on an unpremeditated battle, and the fact of a heliograph being visible at great distances and communication by it being possible "through the enemy's position," makes it much more easy to keep touch than when a flag has to be depended on. It is a perfect instrument for timing a simultaneous flank and front attack as at the Peiwar Kotal, as its flash being seen only in one direction and reaching 20 or 30 miles, it is quite certain that if the flanking column can only reach its objective, the helio will inform the column left in front of the position of the fact without the enemy knowing about it, as would be the case in the old way of firing *sulvos* etc., as the flash would only be visible in that arc of the horizon in which friends were, and the enemy would see nothing of it. If the point had been visible before, its bearing would be carefully taken and the party on reaching it would know that they must aim their helio on the supplementary angle, which at any distance over ten miles would make it widely visible, and ought certainly

* Captain Straton's report.

to be seen by the party left behind. It can be used with tolerable certainty in keeping communications between the advancing columns and the reserve, or between the advanced guard and main body; as it was in the instances quoted *viz.*, at Charasiab and in General Palliser's affair after Ahmed Kheyl, and here the General can to a large extent by using it modify the course of the action. In this case (Charasiab) nearly all the requisites for a good signalling line are fulfilled. The base at one end is fixed. The line is perpendicular to the front of the battle, and fairly safe from interruption by the enemy. The messages are not visible to the enemy, and the instrument is sufficiently far reaching to do away with the necessity of many transmuting stations. Setting aside that it is invaluable in outposts, lines of communications, besieged ports etc., which do not come within the limits of the Essay, we find that the chief tactical use of the heliograph in savage wars is to time a flank march and simultaneous attack; to keep the various columns of an attacking force in touch with the reserve and Commander-in-Chief, and when possible with each other, and in the minor interior movements of brigades, regiments, and battalions, in which its use is much the same in Asiatic as in European warfare. A few words may not here be out of place concerning the way in which messages can be most quickly got to the signalling stations, and about the choice of fixed stations.

To begin with, the officer fixing on the approximate position of a signalling station from which it is hoped that communication will be opened should, if it be a visible high point, which it generally is, take the bearing of it, so as to be able when reached to fix the approximate complementary angle of the last station. If this is not done on reaching the proposed point, it will very likely be difficult to "open" the former station, as it may not be recognisable amongst a number of hills or on a wide plain. If the station cannot be "opened" with the help of this angle, some other position on the hill must be tried, as probably some winding of the road has brought you to a spot slightly, though not visibly, "round the corner" from the last post, and you find your light defiladed by a spur or some other peak, whereas a slight change of position will give you a view of the last helio post at once.

Next, the posts should not be put, when avoidable, in places so steep and difficult to get at, that a staff officer would find it hard to get a message to it. It is better to fix a post where it is easily got at, than one from which a slightly better view is got, but which it takes a goat or mountaineer to reach. All orderlies are not able to climb like chamois. For the same reason they should be kept near the main road, along which the column is marching, so that no time is lost in hunting for the post and getting the message delivered.

Lastly, the efficiency of signallers would be very much increased if they were given a mule or pony to ride. These could climb or be led up to most places where a post has to be established, and the work of a signaller is undoubtedly harder than that of the ordinary soldier. The latter does his march or his fight, and has nothing to do except clean his rifle, do his turn of guard and fatigue, and eat his dinner.

The signaller has to do as much marching, carrying his helio and flag in addition to his rifle and ammunition, and when the march is over is generally sent off to the nearest hill to choose a post, clear the jungle, (a very laborious task which is not realised on the N. W. frontier, but which gives hours of hard bodily labour on each post in work on the N. E. frontier), and signal probably for hours, having generally his own sentry-go to do withal. Messages arrive which he has to take half a mile or so into camp. If he had a mule or pony to do his march on, he would do his signalling very much better.

To conclude, all consideration of the different kinds of visual signalling shows the great superiority of the heliograph over all kinds of signalling instruments, except in the small interior movements of brigades and regiments, which are more rapidly done with a flag. This is confirmed by the fact that it is only nations who habitually fight in tropical countries (the only ones in which the heliograph can be depended on), that lay stress on signalling on the battle-field. In the British army much attention is given to signalling in the field, and the Russian General Sobelev comments on the intelligent use made of it by the British army in Afghanistan, and says that it is essential in all Asiatic wars, and will become essential in all European wars in the future. The nations who have no chance of using the heliograph are practically silent on the whole subject of signalling. From this it may be deduced that signalling will be used as a tactical adjunct in all Asiatic battles, and probably will be used in European wars as a means of helping out mounted orderlies by the side using the offensive. Whereas on the defensive it will be of the greatest use to the Commander-in-Chief, by enabling him to retain the ordering of the battle to a large extent in his own hands.

The use of lamp-signalling has not hitherto been touched upon, and as battles have hitherto been nearly always fought by day, it would seem as if lamp-signalling would never be of much use on the battle-field. But as many tactical writers now attach great importance to night concentrations previous to attacks at day-break, as well as to night attacks, it will be seen what help a signaller's lamp might give in the concentration of different columns for the attack, when each column could be assured that the next column was in its place, and would not be left in uncertainty as to whether the whole of the operations would not break down, owing to some column having lost its way in the dark. On the defence also, it can give information as to whether a night attack on a neighbouring point of the line had failed or succeeded. The element of uncertainty, however, is enormously increased. In a flat country some mist almost invariably rises at night, and even if it only rises 6' or 8' it obscures the lamp. In a hill country the difficulty of identifying your own position, and the direction of the people you want to signal to, makes it very uncertain whether any communication could be picked up, unless there is an opportunity of setting the lamp by daylight, as is invariably done in lamp signalling on the line of communications on service.

THE MOST EFFECTIVE TACTICAL USE WHICH CAN BE
MADE ON A MODERN BATTLE-FIELD,

- (a).—Of the light entrenching tool,
(b).—Of signalling.

SECOND ESSAY,

By Major G. D. STAWELL, The Devonshire Regt., D.A.A.G. for Instruction.

“Semper fidelis.”

- (a).—The light entrenching tool.

“Ceux qui proscrivent les secours que l’art de l’ingénieur peut donner en campagne, se privent gratuitement d’une force et d’un moyen auxiliaire, jamais nuisibles, toujours utiles, et souvent indispensables.”—NAPOLÉON.

INTRODUCTION.

“No defence can possibly be successful that has not an offensive as its basis. The mere fact of field fortifications being constructed is too often considered as limiting the action of the troops to a strict defensive. Viewed in such a light, entrenchments are useless, if not hurtful. The true key to all such questions is to be found by steadily keeping in view that the passive defence of any position by an army is an absurdity.”—*Home*.

In the study of field fortification, as it was until quite recently conducted in our army, and as it is at present carried on at the great cramming establishments, where so many of our officers imbibe their first notions on the subject, the tendency is to lay far too little stress, or often indeed to ignore altogether, the necessity for making all fortifications subservient to tactical requirements, and also the manner in which they may be used to aid the offensive, and to dilate exclusively upon their value for purely defensive purposes. The natural result of such a course is, that many officers have been led to believe firmly that the advantage in warfare must lie with the side which, in their opinion, is alone capable of availing itself of such a powerful auxiliary, and they therefore consider that the defensive type of tactics is, under present conditions, the only possible method of fighting with any reasonable hope of success. Another numerous body of officers, amongst whom are many whose opinions are entitled to every respect, have arrived at a similar conclusion by a totally different method of reasoning; as, according to them, the appliances of modern warfare, such as magazine rifles, smokeless powder, &c., have conferred such a decided superiority on the defence, that it will be hopeless for the attack to compete with it in the future. The officers of the great Continental armies, almost without exception, as well as a portion of those in our own service, are however, of a distinctly contrary opinion. They believe that recent inventions have in no way detracted from the superior conditions attaching to the attack; and they lay great stress on the importance of cultivating in their men by every means possible, that spirit of the

offensive, without which they consider it is absolutely useless to hope for any decided success in war.

It is the belief of the writer, that the more the subject is studied by the officers of our army, the more will they become impressed with the justice of the views of the latter, or what may be called the Continental, school; and it is in the hope that this paper may conduce, however little, towards the attainment of this subject, that its contents have now been written. It is, however, universally recognized, that cases will often occur in the future, as they have done in the past, when it may be necessary for a commander to restrict himself, for the time being, wholly and entirely to the use of the defensive. Such cases would include the defence of lines of investment against the efforts of the besieged to break through,* or of a relieving force to raise the siege,† or an advanced or rear guard holding the end of a long defile to allow time for the passage through it of the main body,‡ or an advanced guard keeping an advancing enemy in check, while the main body of the army to which it belongs deploys for action, and other like cases that may from time to time occur. The increased importance of field fortification does not in itself affect this question, or rather it may be said, if anything, to favour the offensive; since its former rôle of creating obstacles to the advance of the assailant has now greatly diminished in value, while in its new character of affording cover from the intensity of fire produced by the weapons of the present day, it is almost as valuable to the attack as it is to the defence. The arts of field fortification and tactics are now so intimately connected, that it is impossible to carry out the study of the one without combining it with that of the other, and so endeavouring to ascertain in what manner the two parts can best be blended together so as to form one harmonious whole. In our present subject this course will be found absolutely necessary, as the increased use of entrenchments on the field of battle cannot fail to necessitate considerable changes in the application of tactics, which will in all probability be productive of important results, and which no officer who aspires to lead even a small body of troops in the field, can in any way afford to despise or ignore.

Deductions from recent wars.

It will be necessary, in the first instance, to glance at the manner in which fortifications have been used in the field during recent wars, and to consider briefly their causes and effects.

At the time of the Civil War in America, breech-loading rifles and guns had not superseded the general use of the old muzzle-loaders; and although repeating rifles and carbines were used towards its close by a comparatively small number of the troops on both sides, the cause of the very general use that was made of entrenchments was due probably as much to the thickly wooded nature of the country, and to the consequent necessity of guarding against surprise, as to the effects of the fire-arms then in use; for although it was found almost impossible to

* Examples, Metz, Paris, and the latter phases of the siege of Plevna.

† As at the Lisaine. ‡ As at Nachod in 1866.

attack a fortified position frontally, unless the defenders were either very inferior in numbers and had unduly extended themselves, or else that they were suffering from loss of "morale," the result of previous defeats, the fact may be attributed, partly to the almost entire absence of **artillery** preparation, which could rarely be attempted on account of the close nature of the country above referred to, and partly and in great measure, to the great courage displayed by the contending forces, a courage which enabled the defenders of a position to reserve their fire until the assailants were within a few yards of them, and then to fire with such precision and calmness that the actual description of weapon made use of was a matter of hardly any importance: at the same time it was almost impossible to impress on the men of either side the fact that they were beaten and were bound in reason to retire. For instance, at Franklin, though the Confederates attacked the Federal entrenchments with a bravery and devotion which elicited the highest admiration of their enemies, their killed and wounded were piled up in front of the works in such vast numbers that Hood's army was virtually annihilated. Again, at Fredericksburg Meagher's Irish brigade of Federals attacked the Confederates, who were protected only by a sunken fence. The latter reserved their fire until their assailants were within 100 yards distance, and then repulsed them with a loss of 960 men out of 1,200. Losses such as these compelled the leaders on both sides to adopt other means of attack; and we find as a consequence, that the attacking General frequently entrenched a portion of his force in front of the hostile position, in sufficient strength to enable it to hold its ground in case of attack, while with the remainder of his troops he operated so as to turn his enemy's flank, with the object of rolling him up if possible, as Stonewall Jackson's detachment of Lee's army did at Chancellorsville; or at any rate of forcing him to retire from his position, either with or without fighting. This latter system of tactics was fully and successfully exemplified by General Sherman during his operations against the Confederate General Johnston in the Atlanta campaign of 1864, respecting which the former General wrote.—"During this campaign, hundreds if not thousands, of miles of entrenchments were built by both armies."*

In 1866 but little use was made of field fortification, and the few instances that occurred in which attempts were made to benefit by it, stand out pre-eminently as examples of what should be avoided in the future. The position of Königgrätz was partially prepared beforehand by the Austrian engineers; but with so little regard to tactical requirements, that when the troops took up their positions, it was found that many of the works were so badly placed, that they had no command over the country in their front, and consequently an entirely new line of defence had to be taken up at the last moment.† While time and energy were thus wasted, other important parts of the field were entirely neglected. There can be but little doubt that, had the wood of Maslow and the village of Chlum been entrenched and prepared for

* General Sherman's Memoirs Vol. II., page 56.

† *Luttes d' Autriche en 1866* (Austrian official Account) Vol. II, page 176.

defence, the battle, and consequently the whole campaign, might have had a very different result. A similar conclusion might reasonably be arrived at with regard to the battle of Gravelotte in 1870, where, though the centre and left of the French position were strongly fortified with undeniable skill, with the result that the German attacks in that part of the field were repulsed over and over again with heavy losses, on the right, where Marshal Canrobert's corps was in occupation of the villages of St. Privat and Roncourt, but very little could be attempted in the way of entrenching,* as on account of the railway between Frouard and Metz having been cut by the Germans on the 12th August, none of the engineers were present, and but few shovels and picks were available with the 6th corps at the battle.† As the loss of this part of the position entailed a retreat of the whole French army upon Metz, and its subsequent surrender, which in its turn set the German armies free to carry out the investment of Paris, it is hardly possible to conceive the effect that the presence of portable entrenching tools with the 6th corps on this occasion might have had on the after-course of the war. But little use was made of entrenchments, properly so-called, in aid of offensive movements, but a notable feature of the war was the manner in which the German engineers were pushed forward in an attack, so as to be able immediately to prepare a village or any locality that might be captured during the fight, for defence against counter-attacks.‡ and organising them so that they became starting points from which fresh efforts could successfully be attempted.|| The great advantages of a clear field of fire and of cover for the supports and reserve were fully exemplified.

* The German official account states that no entrenchments, with the exception of a few shelter-trenches, were thrown up in this part of the field. Part I. Vol. II, page 7.

† Procès Bazaine.. Evidence of Marshal Canrobert.

‡ A French writer says—"It would have been far better if the Germans had not been allowed to enter the villages and to occupy the first houses. This was a general fault on the part of the French, who instead of organizing the defence of the lisière, left in front some houses or copses, which the Germans hastened to profit by. However little the latter entered a village, they created there a solid "point d'appui." It was a fault which permitted them thus to share in the shelter which covered the defenders, who, in order to dislodge them, would have the same trouble that they hoped to give the assailants. This fault was very prejudicial to the French, and it was entirely caused by want of instruction in time of peace."

La Guerre Franco-Allemande, by Bonnet, Vol. I, page 267.

|| This practice was successfully imitated on occasions by the Russian infantry in 1877. In the "maxims and opinions of the late General Skobelev, extracted from his daily order book to the troops under his command in Asia," we find these words, "The experience of the last campaign has taught me that the infantry attack cannot be definitely carried out without a sufficient supply of entrenching tools, since in the offensive there are moments when an advantage gained must be at once secured by fortifying the acquired position. At Shenovo the 2nd battalion of the Kasan regiment, in the heat of the battle, fortified a village. For this reason I consider the entrenching tools as necessary to the soldier as the cartridges in his pouch."

April Number 1891, Proceedings Royal Artillery Institution.

Another instance occurred at Taghier, where the attacking Russian infantry entrenched themselves with stones and rocks under the fire at short range of the Turks; and under cover of this work they successfully carried the position.

In the war of 1877 there was a great development of the use of earth-works; which in 1870, had been comparatively little used, for the reason that the well-built French villages and châteaux, the woods, fences, &c., enabled the existing features of the ground to be utilized to an extent that was impossible in Bulgaria, owing to the dearth of timber in the latter country, and to the fact that the villages were generally situated on low ground, the houses being very badly built, and incapable of being utilized for defence. Lieut. Greene says of this war that "the combination of trenches and breech-loaders attained such perfection, that the whole campaign may be said to have consisted, tactically, in the attack or defence of more or less hastily constructed positions."*

The Turks were adepts at digging, and made full use of their entrenching tools, of which there was always a plentiful supply; the Russians, on the other hand, began the war with a contempt for digging, which induced them to throw away their tools when going into action, in order to be able more freely to use their rifles; but the heavy losses which they sustained caused an entire revulsion of feeling in their army,† and we find that in the latter period of the war they thoroughly understood the value of entrenchments, and became very expert in throwing them up.‡ The great use that was made by the Turks of tiers of fire and of bomb-proof cover, coupled with the successful repulses of the Russian attacks at Plevna, induced many soldiers in England to believe that the defence had become perfectly irresistible. But these failures on the part of the Russians were due, as was that at Zevin, not so much to the power afforded by earthworks to resist assault, as to the want of system that was displayed in carrying out the attacks; which, on that account, were from the first predestined to failure. The disconnected frontal attacks on no specially determined spots, the dense formations made use of, and the want of sufficient artillery preparation or covering fire, could have had no other result; one attack succeeded another, after the previous one had failed, instead of supporting it at the proper moment; the reserves were badly placed, and in many cases were never made use of at all; and there was total absence of combined action, fire-discipline, and reconnaissance. It is indeed, judging from other actions

* The Russian army and its campaigns in 1877-78 by Lieut. Greene U. S. A. page 421.

† General Skobelev's troops, the night previous to the 3rd attack on Plevna, entrenched themselves on the Green Hills with soup dishes and bayonets, as the supply of tools was very limited. This deficiency of tools prevented the same troops from preparing for defence the two Turkish redoubts which they captured on the following day; and as these works were fully exposed to Turkish fire from other redoubts in their vicinity, the losses of the Russians were very heavy. As a sequel to this, we find that when the troops were, at a later date, ordered to carry heavy country spades on their backs during their march over the Balkans to Constantinople, the order was cheerfully complied with, as the men had learned by experience that their lives depended on their tools, almost to as great an extent as on their rifles.

‡ Take for example the shallow trenches at Gorny Bougarovo, the fortifications of the positions at Pelishet and on the Lom, and in Baker Pasha's splendid rear guard action at Tashkessen.

in the war, more than probable, that these attacks would have been successful, had they been conducted on the sound principles adopted by General Skobeleff, who took care to prepare the way thoroughly by artillery, and then sent his infantry in to the assault, reinforcing them at the moment required, and, if necessary, with the last man at his disposal. We see that on the rare occasions, such as at Ardahan, Lovtcha, and the Aladja Dagh,* when the attack was well prepared and the artillery fire maintained up to the moment of the assault, the Turks offered but little resistance; but when, as was usually the case, the artillery preparation, if carried out at all, ceased when the infantry commenced their advance to the attack, the Turks issued from their bomb-proofs, and manning the parapets, succeeded as a rule in repelling the assault. Several other instances of successful attacks on earthworks occurred during the war, notably in the sortie of the Turks from Plevna on the 31st of August, and in their final attempt to break out of the same place on the 10th December 1877; and it is probable that if these attacks had been properly supported, the ultimate repulses of the Turks might have been converted into brilliant successes. During the operations preceding the surrender of Vessil Pasha's army at the Shipka Pass, several attacks on earthworks, under very unfavourable circumstances, were successfully carried out by the Russians. It has been asserted that the defenders at this period of the war had lost "morale," but this accusation, made against troops who remained in their works, and fought out the combat hand-to-hand, as the Turks did at the Shenovo redoubts, cannot with any show of justice be maintained; and we are bound to believe, with Skobeleff's staff officer, Colonel Kouroupatkine, that up to the end of this war, at any rate, a frontal attack on entrenchments was no more beyond the capacity of good troops than it had ever been before. We may, however, safely conclude that in recent campaigns field fortification has been more than ever recognized as a useful and necessary adjunct to the powers of the defensive, while there has been a marked tendency towards the use of the spade as an auxiliary to the weapons of the offence, and a consequent acknowledgment of the necessity of portable entrenching tools as articles of equipment for the infantry soldier.

Causes of increased necessity of cover.

It will now be advisable, briefly to examine the causes which have led to this result in the past and to consider those that are likely to influence, in this respect, the tactics of the future. The increased rapidity of fire, range, and accuracy of artillery and infantry weapons, resulting from the introduction of rifled guns and breech-loaders, are mainly responsible, so far as the past is concerned; as they rendered it almost impossible for opposing forces of nearly equal strength to approach each other without the aid of cover. Since the conclusion of the Russo-Turkish war there have been vast improvements, both in artillery and

* Ardahan was a fortified town. The works at Lovtcha and the Aladja Dagh, being unprovided with bomb-proof cover, the Russian shrapnel fire was very destructive and demoralizing.

infantry weapons, and in other appliances of warfare, which will render the use of entrenchments in the future still more necessary than in the past. The principal of these are as follows.

Infantry rifle.—A small-bore, long range, magazine rifle, having a lighter bullet and a larger proportional powder charge, giving greater velocity and a flatter trajectory. The penetrative power of the rifle bullet is now so increased, that in the German Regulations of 1890 it is laid down that against infantry the thickness of parapet should not be less than 30 inches of sand or 60 inches of earth, while for wooden buildings or stockades three feet, and for brick walls 20 inches of thickness, are considered necessary. The trunk of a large tree will give but little protection, and a company of infantry firing volleys, will, it is said, cut through and bring down the side of a house in a very few minutes, even at a range of 500 yards. Stockades, unless made of railway iron or similar material, may be said to have become worthless.

Machine Guns.—In 1870 the action and mobility of machine guns were as yet undeveloped, while their tactical use was, as a rule, entirely misunderstood. When, however, they were not pitted at artillery ranges against the enemy's guns, but were kept out of action until they could open fire at short or moderately long ranges, they proved that, if properly handled, they were capable of immense results. Great improvements have now been effected in machine guns, and they will in future often be used to aid or take the place of infantry in long range preparatory or covering fire, in repelling counter-attacks, and holding the defenders to the front of their position, and so setting all the available infantry free to join in a flanking attack. Immediately a position is won, machine guns will be pushed up into it to guard against counter-attacks, and to improve the success already won. In the defence they will be of great value, and if laid and clamped on defiles, such as bridges, &c., the ranges of which would have been previously ascertained, they will be as useful by night as by day, as they do not require relaying after each shot.*

Artillery.—The improvements in this arm of late years have been very great. Breech-loading guns, firing heavy powder charges, with steel projectiles and a flat trajectory, with greatly increased initial and remaining velocities, have come into general use; while fuzes and shrapnel have also been greatly improved. In 1870 the French used shrapnel with fuzes bored only for four ranges, which rendered them utterly useless at any other distances; and as the Germans used only a segmental shell with percussion fuze, which had but little effect, it follows that the statistics of losses are utterly unreliable as regards future wars, since artillery is now some 250 per cent more powerful than it was in 1870. The immense range of modern field guns, extending to 5000 yards and over, is however practically limited to the range of vision, viz. from about 2500 to 4000 yards, as artillery fire is of no use unless its results can be observed. This great range will give a better choice of positions,

* A large number of machine guns are kept by the Russians at their most advanced depôt (Kerki) on the Oxus, in Central Asia (Armed strengths in Central Asia).

and more power of concentrating fire upon the spot selected for attack, as also of utilizing cross or enfilade fire, than was formerly the case. The German Regulations say that a thickness of parapet of from 10' to 13½' is necessary against the direct fire of field guns, though a lesser thickness would naturally suffice in a parapet upon which oblique fire only can be brought to bear. Against shrapnel a thickness not quite so great as that which is necessary against rifle bullets is required. It is considered that the advance in man-killing power, owing to the development of time shrapnel, is probably greater than that attained by the substitution of shell for round shot.* Its effect, at a range of a little over 2000 yards, against troops in shelter-trenches, is, however, according to experiments at Okehampton, only one-quarter that which is obtainable against troops in the open.† This is a result of the very high muzzle velocities and low trajectories of the 12 pr. and other recent types of field guns. Oblique and enfilade fire with shrapnel will be employed in preference to frontal fire in the future, as the effect is vastly superior.

It has been conclusively proved at Plevna, and on other occasions during the war of 1877, as well as more recently by experiments, that artillery preparation against strong earthworks, provided with bomb-proof cover for the garrison, is of no use whatever, except to ensure the destruction of obstacles, which is in itself a most important duty.‡ Where however, bomb-proof cover did not exist, as was the case at Lovtcha and the Aladja Dagh, it was even at that period, almost irresistible in its effects. It would naturally follow, that if the defending troops could remain in their casemates, as the Turks did at Plevna, until the assailant's guns are compelled to cease fire through being masked by the advance of their own infantry, they would suffer but little loss; while on the other hand, on account of the great accuracy of modern artillery fire, they would suffer severely if they were forced to man the parapets while the assailant's guns were still able to fire effectively. It has in consequence been generally recognized that some additional power must be given to field artillery to enable it to render earthworks provided with bomb-proofs untenable; and nearly all the continental nations of Europe have now either adopted a field howitzer for that purpose, or have at least provided their field guns with the means of carrying out indirect fire. The indirect fire of ordinary shrapnel, though capable of immense effect against troops in shelter-trenches, will not however be of

* Major Keim, in a lecture delivered at Berlin in December 1889, said, "It is uncommonly difficult in these days under normal circumstances even to initiate an infantry attack, quite irrespective of carrying it through, as long as any important portion of the enemy's artillery remains effective. Considering the extraordinary precision of modern artillery fire as compared to that of past wars, an infantry attack which has to work its way through artillery fire in its principal phases, has no prospect of success." *Journal R. U. S. Institution* Vol. 34 page 544.

† Vol. XVIII page 392 *Proceedings Royal Artillery Institution*.

‡ At Telich, 56 guns firing for nine hours continuously on five battalions that were entrenched, inflicted hardly any loss; while at Gorni Dubniak 4000 Turks and four guns, being attacked by 20000 Russians and cannonaded for six hours by 60 guns, inflicted a loss of 3300 men upon their opponents, and only gave way at night-fall because they were not supported.

any great use, if even bullet proof overhead cover can be constructed; and as it is at long ranges alone that the "drop" of shrapnel and rifle bullets will render them very searching, it may be assumed that a thickness of from 8" to 20" of earth will form an effective overhead cover against these projectiles. Resort must therefore be had either to breaking powder with ordinary projectiles, or to high angle fire from mortars or howitzers, either with or without explosives charges.

The Bavarian General Von Sauer is of opinion, that against the perfectly vertical fall of mortar or howitzer shells, filled with high explosives, and fired by a time fuze, no breastwork will give any protection; and he adds, that as such a projectile can penetrate every head-cover which in field warfare can be opposed to the action of its burst, a body of men exposed to such a fire can only hope to escape from it by abandoning their position; in which case the object of the artillery preparation will have been fulfilled.* There is, at any rate, no reason to doubt, that as the accuracy of modern vertical fire is undeniably very great, it can accompany the advancing infantry up to the threshold of the place to be assaulted, and can thus effectually prevent the defenders from manning the parapet without exposing themselves to very heavy losses, while it can also effectually cover a retreat should such a step become necessary.† Batteries using vertical or indirect fire can come into action on the reverse slopes of hills, and so need not be in the slightest degree exposed to view; and the use of smokeless powder will render it still more impossible for the enemy to make out their position. In No. 750 of *La Revue Militaire de l'Etranger* it is stated, "It is now admitted almost everywhere that, as in siege warfare, so in the attack on field fortifications, plunging fire will have a preponderating rôle. For that reason in Germany, Russia, Austria, and Switzerland, a number of mortar batteries have been organized to accompany the field armies." The Russians are so alive to the importance of curved fire, that they have recently added a third Field Mortar Regiment to their army.‡ The Germans have adopted a breaking-up shell, loaded with a powerful explosive, and provided with a double fuze, by means of which their field artillery will be enabled to participate with the whole of its guns in the attack on an entrenched position; thus avoiding the manifold evils entailed by the use of special guns, such as howitzers, which are useless for any other purpose.¶ It is impossible, as yet, to forecast with accuracy the result of the adoption of these high explosives as bursting charges for shells. Colonel C. B. Brackenbury,

* Royal United Service Institution Journal, Vol. 35, pages 74-83.

† Sir Charles Dilke in his recent article in the *Nineteenth Century* on the French army, says that in the manoeuvres of 1891, the attacks were prepared by howitzer batteries using high explosives, and that the artillery made a practice of firing over the infantry until the last moment.

‡ Each of these Regiments consists of four batteries, each battery having six 6-inch mortars, which fire both shrapnel and common-shell, with a maximum range of 3500 yards. *Proceedings Royal Artillery Institution*, Vol. 17. No. 6, and Vol. 18, No. 8.

¶ Colonel Von Löbell's annual report upon changes and progress in Military matters during 1890. *Journal Royal United Service Institution*, Vol. 35, page 125.

agreeing in this respect with General Von Sauer, states that they have been found capable of clearing away everything in the shape of earth-works;* while Major Savage says, "It must be remembered that a high explosive is intensely local in its action, doing its work only on what is in immediate contact with it. If this is masonry, iron, or wood, the effect of course is great; but even with large shells like the 6-inch, it was found at Lydd that they have, against earth, no greater effect than a similar amount of gun-powder, as the work is done on a more compressible material and does not extend far."† It is extremely improbable that these high explosives will be adopted in our service, as they do not stand changes of climate; they also rapidly deteriorate, and become dangerous by transport. Should we however, be called upon to meet any of the Great Continental Powers of Europe in the battle-field, we shall have to face one or all of the methods above mentioned, and we must take our measures accordingly.

Smokeless Powder.—The conditions of warfare in the future will in all probability be greatly affected by the introduction of smokeless powder, though to what extent it is at present impossible to say, since this powder has not as yet been subjected to the ordeal of the battle-field; and it will therefore be necessary for us to rely upon theory in forming our opinion as to its effect on the tactics of the different arms. We have however, the benefit of the conclusions that have been arrived at by competent officers of our own and other nations, who have witnessed the manœuvres of continental armies during the last two years. It may be taken for granted, that smokeless powder will render the successful carrying out of reconnaissance exceedingly difficult; and it will therefore be no easy matter for an assailant to ascertain the range and position of his enemy's guns and troops; but when once these difficulties have been overcome, it will be easier to keep up an efficient fire, as smoke will no longer interfere with the laying of the guns, and the fire both of artillery and infantry, will become far more destructive than ever, as fire discipline will be easier to maintain. The position of the assailants' guns will also remain undiscovered to the adversary, provided they are well brought into action, as long as they remain stationary, but any movement, whether of artillery or other troops, within effective range of an enemy, will result in heavy loss.

The Use of Cover.

It will be seen from a perusal of the above short account of the forces that must be considered as chiefly affecting the warfare of the future, that now, more than ever, it will become a matter of necessity to obtain cover, either natural or artificial, from the intensity of the fire that can be brought to bear on an object, when once its position has been ascertained. This necessity will apply equally to the attackers and the defenders, as without the aid of cover the former will find it impossible to bring their infantry within assaulting distance of a position,

* "Field Works," page 354.

† Aldershot Military Society Lecture No. 4 by Major Savage, R.E.

while the latter will be unable to stand their ground in the face of the storm of projectiles that will be hailed upon them, and will be forced to retire without even awaiting the attack. Another important fact is that cover from view will become almost, if not quite, as important as cover from fire. Any works that may be thrown up must therefore be carefully concealed by means of turf, snow, heather, branches of trees, &c., so as to make them resemble the surrounding country as nearly as possible. This will be a matter of the utmost importance, as when once the position of a work has been discovered, the accuracy of modern fire will soon go far to render it untenable to its occupants.* The necessity of cover has now been recognized almost universally, though many authorities are of opinion that the "morale" of the soldier will suffer to a dangerous extent, should the use of entrenchments be generally adopted in the attack, as they consider that a spirit of timidity will thereby be engendered, and that dash and *élan* will come to be regarded as dreams of the past.

It must, however, be taken into account that armies engaged in European warfare will in future consist, to a great extent, of an intermixture of very young soldiers and of men recalled from the reserves, who will, at any rate for some time, be somewhat estranged from the beneficial power exerted by discipline; and it may be taken for granted, that the sudden infliction of heavy losses will have upon troops such as these, a far more deteriorating effect than would have been the case with the long service soldiers of the past. Regarding the matter from this point of view, it becomes a question whether the use of entrenchments will not, by diminishing largely the percentage of losses, have a decidedly beneficial effect upon "morale." In order to ensure this result, and at the same time to cultivate in our army that spirit of the offensive, to the importance of which we referred in our opening remarks, it will be necessary for officers to instruct their men how to make shelter-trenches rapidly; at the same time impressing upon them that they will often have to occupy them merely as a temporary measure, and that they must at all times be ready to act upon an order for a further advance. This is considered in Germany a matter of so great importance, that in the regulations it is laid down that shelter-trenches are, whenever possible, to be constructed for men to fire from in a standing position, as being most favourable for the movement to the front, which must be inculcated on the men as almost a necessary consequence of occupying a shelter-trench. Baron G. Von der Goltz, in an excellent pamphlet recently published, says, "If in time of peace we exercise our troops continually in making entrenchments, and in briskly leaving them in order to seek a new position nearer the enemy, we will abandon

* A well known and talented Belgian writer, Captain Waldor de Heusch, says that, "Now-a-days, when smoke no longer betrays the points that are occupied, we believe that it will be eminently useful to raise epaulments, redoubts, and parapets upon several parts of a position, without occupying them, in order to attract the fire of the attack. A curtain of shrubs in front of a *point d'appui* that is actually occupied, will be very valuable." *La Tactique d' Aujourd' hui*, 1890, page 392.

quickly the idea that shelter-trenches constitute a peril for men whose courage is not absolutely proof against all danger. We are convinced that the giving, in peace-time, the most careful instruction to the troops, will result in inculcating a spirit of discipline which will reduce to a minimum the danger of taking undue advantage of cover; a discipline by means of which the sentiment of duty will exercise a higher influence upon the men than the instinct of personal safety.*

It will probably be urged that, in our army, such a system of training cannot be enforced, on account of the difficulties of obtaining ground on which to carry out the instruction required, and also owing to the fact that portable tools are not served out universally to the men as articles of their equipment. The latter difficulty should be obviated at once, as it is impossible that the small amount of instruction in digging that our soldiers undergo annually during their company training, can, in any way, impress upon them the absolute necessity of regarding their entrenching tools as of secondary importance only to their rifles. Portable entrenching tools should be served out to, and become part of, the equipment of every infantry soldier; he should invariably parade with them in field day, drill, and marching order, and he must be taught the necessity of using them on every occasion, until it becomes a second nature with him to do so. By this means only can our men, who equally with the Russians at the commencement of the 1877 war, have an innate aversion to digging, be spared from the terrible experiences which befell the latter, and be enabled to take the field on an equality, in this respect, with their adversaries. The system, by means of which our home army is becoming year by year more concentrated at large permanent camps, should render it a comparatively easy matter to carry out the necessary training of both officers and men; while in India we have facilities for so doing that do not exist in many other countries in the world. We must therefore make up our minds to utilize them to the fullest extent possible, so that we may not come behind other nations in this important respect. The Russians carry out the instruction of their troops in entrenching carefully and methodically; and in their manœuvres they constantly practise throwing up earthworks, both in the attack and defence of positions. Their latest regulations on the subject say that,—“the trenches generally employed on the field of battle will have an especially insignificant profile, and that the rapid construction of trenches of this nature, by the troops who are to occupy them, forms the problem of self-entrenchment.†

The regulations go on to say, that “men should be practised in making shelter-trenches by night, and their tracing should also be then practised.” This appears to be a matter of great importance, since it may often be necessary to select this time to throw up entrenchments; and unless the men have been constantly practised in digging at night, confusion and accidents, besides loss of valuable time, will be the inevitable result. Lieutenant-Colonel Carré, R. A., writes—“The Bulgarian

* *Patrouilles indépendantes*, p. 16.

† *United Service Institution of India Journal*, Vol. 29 page 52.

infantry commence to advance to the attack in the usual formation, until the intensity of the enemy's fire compels them to seek for protection under cover, which they obtain with remarkable rapidity by the use of the half spade, half trowel, each soldier carries in his waist-belt; the object of their drill being to get at the enemy. Special attention is devoted, in order to instruct the soldiers in placing themselves under cover whenever practicable.* As regards France, Sir Charles Dilke informs us, that although entrenching tools were carried by the troops in the recent manœuvres, little or no use was made of them; and Captain Maude states, that in every case of field entrenchments that came under his notice, the works were of insufficient profile, and were badly adapted to the ground. In remarkable contrast to this, Captain Grierson, referring to the German manœuvres, says, "Shelter-trenches, and other earthworks, are only taken into consideration, in so far as they have been actually constructed; and it is noteworthy how constantly these have been employed. Troops are invariably in marching order with their entrenching tools, and they make full use of them. If for the sake of sparing plantations, gardens, &c., trenches can only be marked, a report is made to the Umpire, who takes this into consideration in giving his decision.† Mr. Saunders, in a lecture delivered at the R. U. S. Institution, stated that at the German manœuvres in 1889, the Xth corps, after falling back on the previous day, had taken up a position for defence, and "when I rode up to the position in the morning I first came upon lines of wire fencing, consisting of stakes four deep, with wire twisted across and along, absolutely impassable for cavalry, and for infantry most embarrassing. If the enemy's infantry ever reached the wire fences, they would stand an excellent chance of being annihilated while attempting to "warstle" through them. Next came our earthworks, line upon line of them. Behind them our infantry were nearly as safe as in their beds."‡ All this shows us a picture that should lead us to reflect very seriously on our own shortcomings. The writer has before him some questions, concerning which he recently wrote to a staff officer at Aldershot, together with the answers he has received. They are as follows:—

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|---|--|
| Q. 1. Are the infantry battalions at Aldershot provided with the Wallace entrenching tools? | A. 1. All. |
| Q. 2. If so, what proportion of the men carry them, and do the remainder carry pick-axes? | A. 2. In various proportions: from 12 to 50 per company. No pick-axes. |
| Q. 3. Is any use made of the entrenching tool at field days? | A. 3. <i>I never saw any.</i> |
- Comment on the last answer is needless.

Let us take the lesson to heart while there is yet time, and endeavour, so to train our men, that when the day of battle comes, they may

* Proceedings Royal Artillery Institution, November 1888.

† Journal Royal United Service Institution, August 1891, Vol. 35 page 925.

‡ Ibid, Vol. 34 page 878.

be spared unnecessary loss, and so may emerge victoriously from the searching ordeal.

The Tactics of the future.

Before discussing the question of the relative value of different sorts of works, it will be necessary to consider the forms that the tactics of the future will probably resolve themselves into, and the part that entrenchments will take in the various stages of the combat.

The Attack.—One of the principal obstacles that the adoption of smokeless powder has thrown in the way of the attack is the vastly increased difficulty that it entails of executing reconnaissances of an enemy's position; while the necessity of obtaining accurate information is, at the same time more than ever essential to the success of the undertaking. It will be necessary for the attacking General to know whether the position is entrenched, and if so, the localities of the various works and "points d'appui" and if the earthworks are provided with bomb-proof cover. He will also require information as to the manner in which the flanks are protected, if the position is unduly stretched, where are the positions of the artillery and those of the reserves &c. The approaches must also be carefully studied, with a view to selecting positions for artillery and covering parties of infantry, and to seeing in what places the ground may be utilized to enable the bodies in rear to get within supporting distance of the first line; as with the flat trajectories of the present weapons, this may be regarded as a matter of impossibility on ground that is flat and open. Broken ground should, on this account, always be selected for an attack. The defenders will, on their part, take all possible measures to prevent the enemy from making his reconnaissances; and in this they will be aided by smokeless powder to such an extent that cavalry will, in all probability, be unable to approach sufficiently near to acquire the desired information*, and it will become necessary to replace them by carefully trained infantry patrols, who, acting to a great extent at night, will also take every advantage of stormy, rainy, and foggy weather, as it is probable that the attention of the hostile sentries will be then considerably relaxed.† Balloons and ladder-observatories will also be utilized for reconnoitring purposes, as also for observing and reporting the effects of artillery fire, &c. In Germany it is believed that reconnaissances may have to be executed by cavalry "en masse"; and, according to Mr. Saunders, it is confidently asserted that such operations will, in all probability, be attended with

* L'Avenir Militaire of the 1st December 1891 in an article headed "La Cavalerie aux Manœuvres," combats the idea that smokeless powder has rendered it impossible for cavalry to perform the duty of reconnoitring; and says that under all circumstances the patrols of the latter arm have been able to approach sufficiently near the enemy's position to obtain whatever information was required concerning it. This is contrary to the opinion expressed in Germany, but the matter is one that can only be decided by being put to the proof in actual warfare.

† These infantry patrols are now largely made use of in the French and German manœuvres.

great results. The work of reconnaissance having been successfully accomplished, the General will have to decide whether he will :—

- (1.) Make a frontal attack, which would probably be combined with strong demonstrations on a flank ; the latter being carried out by mounted infantry and machine guns, protected by cavalry ; or,
- (2.) Make a frontal attack combined with a strong flank attack ; or,
- (3.) Threaten the enemy's front with a weak force entrenched, and throw the bulk of his forces on his enemy's flank ; or,
- (4.) Make an attack during the night or at dawn.

The question of the advisability or otherwise of flank attacks is a large one ; and as all attacks, whether flank or frontal, resolve themselves entirely into the latter, as far as the troops immediately interested are concerned, we will confine ourselves to considering how such an attack will be conducted, leaving the merits of the various systems to be considered in their higher aspects by the Commanders, who will have to be guided as to their decision greatly by local circumstances, which it would be as impossible as unnecessary to discuss in this paper.

If the enemy's position is but lightly entrenched, or if the ground favours the artillery of the attack, the latter will probably come into action at an extreme range of about 4500 yards, the effect of the fire being noted from an observing station and signalled to the batteries. When it has taken sufficient effect on the hostile artillery, the first line of infantry will advance to within about 600 yards of the position, and having entrenched itself rapidly under the cover of its firing line, will commence heavy fire.* In order to entrench themselves during an attack, men must be taught to make excavations with their entrenching tools when lying down. This is regularly practised abroad. The artillery will meanwhile advance to within about 1700 yards, and from that distance it will cover the selected part or parts of the position with a hail of shrapnel. The guns will here require artificial shelter, as will also the escort on the exposed flank. When the fire of the defence is observed materially to lessen in intensity, every effort will be made to distract the enemy's attention by feinting from the line of shelter-trenches ; and so, by engaging him all along the front, prevent him from reinforcing at the decisive point. Meanwhile, masses of troops will have been rapidly concentrated, under the shelter of either natural or artificial cover, (the latter if necessary, must have been made beforehand, possibly on the night previous), and the attack will be pushed home on the point selected with the utmost vigour, by means of successive lines of infantry, probably accompanied by a portion of the artillery.† The remainder of the guns and mortars, if any of the latter are present, will maintain their fire, if possible, until the attacking infantry are close

* In Germany it is considered that the skirmishing line must be far stronger than heretofore, as at 600 yards the intensity of the enemy's fire will not allow reinforcements to cross the beaten zone.

† Care must be taken that the infantry are kept back, until the fire of the defenders is sufficiently overpowered to enable them to cross the dangerous space without the risk of annihilation. This is a matter which is rarely sufficiently heeded at manœuvres.

to the enemy's line of works. The infantry, from the moment they are committed to the final assault, will carry it out with bayonets fixed, as rapidly as possible, compatible with a steady advance; they should not even stop to fire, as every moment of delay will but increase their losses, and the effect would probably not materially affect the result, as the fire of the artillery and covering parties of infantry will, it is presumed, ere this have completely gained the mastery over that of the defence. Separate parties of infantry will be detailed to fire long range volleys from entrenched positions further in rear or on a flank, for the purpose of aiding the artillery to cover the attack. The moment the attack is successful, the troops who have carried the position must rally and entrench themselves, leaving the pursuit to be taken up by others coming up from the rear. If there have been any fights for localities, these, when captured, must also be immediately prepared for defence against counter-attacks, and organized as starting points for further enterprizes. Artillery and machine guns must hasten up to the position the moment it is captured, to fire on the retreating enemy and guard against counter-attack; and cavalry will seize the opportunity to take up the pursuit. A rallying position should have been constructed meanwhile by the troops in rear, in order to cover a possible retreat. It may, however, happen that the enemy has entrenched himself strongly, and that his works are well provided with bomb-proof cover. In this case, the carrying out of the attack will be a far more serious business, and may even extend over several days; ground being won, as it were, by stages. Von der Goltz in the "Nation in Arms," says, "To break through a defensive line, demands numerous and good troops, together with an iron will on the part of the commander, who must be one who will not shrink from bloodshed. Such a feat can never more be performed at a single blow, but must partake more of the nature of a boring operation, every step gained being secured by earthworks, so that it will be the case of position approaching position. Frontal battles on a large scale will all be of the same character, and will last several days."* As the occasions will be rare when a General will be able to manœuvre his adversary out of such a position, he must make up his mind to attack it. The preparation for the fight would, in such a case, partake of the nature of a regular siege. Works must be thrown up during the night at about 1700 yards distance from the position, so that on the following morning they will be sufficiently advanced to shelter the artillery from the enemy's fire. The guns will be protected by infantry escorts, who must be pushed forward some 500 yards. The flanks must also be similarly guarded, and the escorts must entrench themselves. According to the issue of the artillery duel the commander will decide whether he will commence the assault at once, or postpone it until the following day, in which case he would continue the making of entrenchments in order to assure himself of solid "points d'appui" for his after operations. There will in most cases be a decided tendency towards undue extensions to a flank on the part of the attack, in order to carry

* Journal Royal United Service Institution, Vol. 31, page 246.

out a turning movement, and on that of the defence to meet a threatened danger, and consequently there must of necessity come a time when the limit of safety (which has been greatly increased by the retaining power conferred by modern weapons) will have been passed, and the line, either of the attackers or of the defenders, as the case may be, will be stretched in undue proportion to the number of troops occupying it.* Such false movements must be carefully awaited, and instantly taken advantage of by the adversary. In order to avoid such extension the defender will, in all probability, echelon a strong body of troops in the rear of an exposed flank, so as to be in readiness to come down on the exposed flank of the flank attack; he will also try to deceive the enemy as to the points on which his flanks rest, and while endeavouring to make him commit himself to an excessive extension he will hold himself in readiness to attack the weakened line of his adversary as opportunity offers.

We have now endeavoured to demonstrate that hasty entrenchments will be of use in the following instances during an attack :—

- (1.) Entrenching the front, in order to hold the enemy along the line, and prevent his reinforcing the points selected for attack.
- (2.) Cover for guns† and for infantry escorts, as well as for long range covering parties of infantry.
- (3.) Cover for reserves massing for the assault.
- (4.) Entrenching the position when gained, or any fortified points or localities, such as farms, woods, villages, earthworks, &c., for defence against counter-attack. This will be done by loopholing walls, making banquettes, reversing shelter-trenches, barricading entrances to villages, preparing hedges, strengthening the gorges of field works, and making entrances in the original fronts, &c.
- (5.) Improving communications.
- (6.) Entrenching a rallying point.
- (7.) Objects such as single trees, or clumps windmills, towers, &c., that would probably be used by the defenders as range points should, if possible, be demolished.
- (8.) Clearing away any cover near the artillery positions that would conceal the approach of hostile infantry.

* In the Infantry drill 1869, p. 398, it is laid down that for the defence about 5 men per yard will be necessary including all arms and reserves. The Germans consider 8 men per metre necessary (*vide* duties of General Staff Vol. II, page 276). Probably Captain Mayne's estimate of from 7 to 10 men per yard of front for the defence and 12 to 14 for the attack, including reserves, and allowing for the troops required to carry out the flank attack as well as those required to hold the enemy in front, is fairly reasonable; but it is impossible to lay down these or any other numbers dogmatically, as in practice the best use must be made of troops and ground that are available.

† It may often be advisable only to provide cover for the artillerymen and ammunition, the guns being left in the open, and their limbers and teams being kept in the rear. The German field artillery drill regulations of 1883 lay down that protecting earthworks, especially for the gun detachments, are to be made use of in all cases when time is available for their construction, cover for limbers and waggons will only be thrown up in positions which have been prepared beforehand.

The subject of night attacks will not be discussed in this paper. It may be mentioned, however, that the Germans regard them with disfavour, though they consider that it will often be possible to push their preparations so far forward during the night, that the artillery will be entrenched in their first position ready to open fire at day-break ; but beyond this they do not consider it will be safe to go.

The Defence.—In war it will not often occur that two armies, equally bent on the offensive, will meet and give battle to each other, but in 99 cases out of 100, one of the commanders will have been forced, on account of his army being inferior in numbers or "morale," to act temporarily on the defensive ; either in the hope that his adversary may expend his strength in battering himself against the position he has fortified, as Hood did at Franklin, and as Bazaine hoped that the Germans would do at Gravelotte ; or simply to gain time for his army either to obtain reinforcements, or to recoup itself in whatever it may, for the time being, be deficient of. In deciding on the manner in which a position is to be fortified, a General will be guided by,

- (1.) The object he has in view, viz., whether the defence is to be passive or active.
- (2.) The time and means at his disposal.
- (3.) The condition of his troops.

Should the General be forced to decide upon a passive defence, he will throw up obstacles, or strengthen those naturally existing along his whole front.* Such a course should only be necessary in certain cases before specified ; as under ordinary circumstances, a commander should never abandon the intention of taking the offensive should an opportunity offer itself.† As a general rule, he will probably seek to strengthen part of his position with the object of holding it with a portion, say from $\frac{1}{2}$ to $\frac{1}{4}$, of his troops, the remainder being reserved for the decisive counter-attack. Should there be ample time at his disposal he may, after preparing the ground in front of the position to a distance of some 600 to 800 yards, proceed to throw up shelter-trenches and construct gun pits, cover for supports and reserve, place localities such as woods, villages, houses, &c., in a state of defence, construct bomb-proof shelters, open and closed works on important points, improve communications, blow up bridges, or prepare them for destruction, and any other works that may appear to be necessary ; but in such a case it would be advisable that he should, before expending so much labour and time, be fully assured as to his own plans, and be tolerably certain that his adversary intends, or will be obliged, to attack him, at all risks, wherever he may be found. If, on the other hand, his enemy is close at hand, only hasty works can be thrown up ; the front and

* The preparation of the Lisaine position by Von Werder affords an excellent example.

† General Brialmont on page 17 of his work "Hasty Entrenchments" says, "To arrange shelter with a view to offensive movements is the first problem to be solved, for if defensive works had the effect of keeping one's troops stationary, they would have to be given up, as nothing is more dangerous or more opposed to the spirit of modern tactics."

exposed flank being first prepared, and every moment of respite that is afforded being taken advantage of to complete the preparations and develop the scheme of defence. It has been said by General Brialmont that "as a rule the works required to fortify a position must be carried out in the time which elapses between the end of a march and the commencement of an action on the following morning."* If we accept this conclusion, it will therefore follow that the condition of the troops is a factor which must be taken seriously into account when the decision is being arrived at, as to what amount of work it is expedient to carry out in the time available. The fatigues connected with life on service are always great, while an ample supply of good food is not always obtainable, and it is therefore of the greatest importance not to overtax, by an excessive amount of work, the nervous energy of the men, as they would be rendered in consequence morally and physically unfit to take their part in the action of the morrow.

Shelter-trenches should be constructed with an eye to depth rather than width, on account of the searching power of rifle bullets and shrapnel at long ranges. (Figures 4 and 5 Plate IV. of the Manual of Elementary Field Engineering are excellent types.) This increased depth is not to be regarded as a means of opposing a serious obstacle to the enemy's advance, as the object of shelter-trenches is only to protect the occupants so that their fire may be all the more effective. Deep trenches afford very good protection against direct shrapnel fire, but when exposed to oblique fire, it has been found by experiments that small bonnettes of earth, one foot higher than the parapet, will save five-sixths of the losses that the occupants of the trenches would otherwise suffer. Here again, however, it remains to be considered whether it would be worth while to risk the decreased chance of the position of the trenches remaining invisible to the enemy should such bonnettes be constructed. Intervals must always be left between the deep trenches, to enable the reserves to pass through when they assume the offensive. When laying out shelter-trenches it is an absolute necessity to bring the eye down to the level of the eyes of the men who will have to fire from them, as if this is not done, the probability is that the trenches will be as useless as were those of the Austrians at Königgrätz. A good type of deep trench can be prepared in two hours, and in two hours more it may be provided with overhead cover to guard against shrapnel and rifle bullets. If time presses, small portions of the trenches may be covered in at intervals, and the men crowded into them until required to fire. The ranges of all prominent objects should invariably be taken and communicated to officers commanding battalions for the information of company officers. It must be remembered, that while the penetration of the present fire-arms renders houses and walls little better than useless, defensible localities, such as woods, villages, &c., possess the great advantage that they can at once be utilized, and every man's work increases their capacity for defence, while the number of men required as a garrison and for the work of preparation, are, roughly

* Hasty Entrenchments page 35.

speaking, about equal. Redoubts on the contrary, require three reliefs of six hours each, or at least four times as many men to make as to defend; and they are not of much use until finished. It therefore follows that they will be used very sparingly, and only for the defence of flanks and specially important points, a minimum command and profile being given at first, and both being strengthened afterwards as time permits. Such works must be adapted to the ground, and their trace should be as simple as possible, the principal object being the development of fire in the probable direction of the hostile advance, care being at the same time taken to avoid the possibility of the faces being enfiladed by the enemy's fire. For works of this sort, bomb-proof cover will be necessary.

Machine guns would be placed in redoubts, but guns, would, as a rule, be in emplacements outside. Breastworks can be made in one relief of $4\frac{1}{2}$ to 6 hours, and are capable of further development. It must be remembered, that owing to the penetration of the new bullets, earth parapets exposed to rifle fire will require, at the very least, a thickness of 30 inches, and this in itself will add considerably to the time required to throw up shelter-trenches. It will therefore be advisable to make every use of existing cover, as time will thereby be saved, and the line of defence will not be rendered unduly conspicuous. It may be assumed, that taking into account the great desirability of not overtaxing the physical power of the troops, and also the fact that the introduction of curved fire, smokeless powder, high explosives, delay action fuzes, &c., has rendered invisibility a matter of the first importance, only hasty entrenchments such as deep shelter-trenches, which will be carefully concealed, and provided with ammunition recesses and splinter-proof cover to guard against shrapnel and rifle bullets, will, as a rule, be constructed; while bomb-proof cover will be reserved for works of strong profile, which will not form part of the defences of an ordinary position. Every effort will be made to ensure a clear field of view and of fire, as being of more use than any number of obstacles; for, as Colonel Maurice said in 1872, "For one place that has fallen because the men on the defensive had not sufficient cover, a dozen must have fallen because the obstacles to fire in the front had not been cleared away."* It is probable therefore, that hastily entrenched positions will include deep trenches for the front line, with the supports either in the same trenches or in similar ones very near at hand.† Local reserves will be sheltered by the ground, if possible, otherwise entrenchments must be made for them. Such reserves will probably be required where the ground in front of the position is sufficiently broken to permit of the possibility of the enemy arriving in large numbers within attacking distances, say 600 yards, and in re-entrants, where they would probably be able to act with effect against the force immediately opposed to them, which would naturally be led against the flanks of the salients, and so would expose their own flank to a counter-blow. The general

* Wellington Prize Essay, page 167.

† Steep slopes should be defended by flanking fire, if they cannot be commanded from the summits.

reserves for the grand counter-strokes will be sheltered by the ground, whenever possible, in rear of, or in the intervals between, the fortified pivots.

Great responsibility will devolve upon officers with whom the decision will rest as to whether it will be necessary or not to construct artificial cover for the reserves; as on the one hand, it will be advisable to spare the troops as much labour as possible, while on the other it will be necessary to shelter them, wherever possible, from the demoralizing effects of shrapnel fire and the certain loss of nerve power resulting therefrom. In order to form a correct decision on this most important point, a knowledge of the true principles of defilade (as distinguished from those laid down in the text books) is absolutely indispensable; and printed tables, showing the angles of "drop" of the shrapnel and rifle bullets of the enemy's weapons at different ranges, should be issued to every officer at the commencement of hostilities.*

A second line, if prepared,† should be from 600 to 800 yards in rear of the first, so that if the latter is captured, the enemy's guns, on advancing into it, will be exposed to effective infantry fire from the 2nd line. It may also be necessary to protect one or both flanks by similar entrenchments, but the General will be guided on this point by the local features of the ground. Gun-pits or epaulments will be constructed wherever necessary; and if time is an object, the artillery will require assistance from the infantry, as the number of tools they carry is but small. Stress has already been laid on the importance of providing a clear field of fire from both the front and flanks of a position; and with the precautions above mentioned, and the use of brushwood or wire entanglements in parts exposed to hostile attack, and where a counter-attack is not intended, as well as the preparation of woods for defence,‡ it is probable that the defender must, as a rule, content himself;|| though if time permits, the preparation of "points d'appui" may be taken in hand. It cannot, however, be too often repeated, that every object that catches the eye greatly assists the opposing artillery in range taking and aiming.

* An excellent paper on "defilade" by Major Watson, D. A. A. G. for Instruction, was published in the Royal Engineer Journal of 1st August 1891.

† The expediency of preparing a second line is denied by some authorities, who would devote all their available time to making the first line as strong as possible, as they point out that anything like an orderly retreat could not be carried out in the face of the fire arms of the present day.

‡ The German Regulations say, that as the cover formerly afforded by trees will now often prove illusory, it will be advisable in occupying a wood, to make shelter-trenches some little distance in front of the lisière, as the crashing of the bullets through the branches above tends to unsteady the troops by giving them an exaggerated idea of the enemy's fire.

|| The description of work would vary with the nature of the country. Lieut. Greene, describing the works carried out in the Balkans, says on page 430 of his book, that "their general characteristics were a succession of tiers of fire, both for infantry and artillery, rising to a height of 500 feet or more on the mountain sides, with an abundant use of traverses; the various works being connected with good roads. Bomb-proofs would probably have grown had the troops remained long in the works." In Afghanistan and other similar countries it is probable that such a system as that above described would be adopted.

Captain Clayton, in his prize essay on field entrenching, referring to the battle of Gravelotte, remarked, "Wherever a definite object of attack presented itself, against which a concentrated fire of artillery and infantry could be brought, there the assailants gradually advanced; but wherever they came face to face with a continuous line of defence, without salients or exposed points, and with a clear field of fire in front, there the forward movement was stopped."* If such a conclusion could be arrived at with respect to this battle, in which the German artillery used nothing but common shell, while their infantry rifle was useless at ranges beyond 600 yards, it may certainly be held as applying with far greater force to those of the future, where both infantry and artillery will, as we have seen, be possessed of a power, beside which the effects of the weapons employed in 1870 will appear as mere child's play. It would therefore appear advisable, that the "points d'appui" of a position, should, wherever possible, be sheltered by the ground from long range fire, and their action reserved until the enemy arrives within a short distance of them, when their effect would be greater, as it would be unexpected.

General Dragomiroff sums up the matter thus, "There can be neither regular nor shapely works on the battle-field. All fortification is contained in two principles, (1) make the firing line at right angles to the direction you want to command most effectually, and (2) see that the enemy cannot enfilade this line. Works of this kind must be limited to what is absolutely necessary, as they fatigue the men and obstruct movement."† This is undoubtedly true, and the tendency to err in the direction of too much cover must be carefully guarded against. It is only by constant practice in peace time, in problems relating to the amount of work in the way of raising entrenchments and clearing ground that can be done in a certain time, under certain conditions, by a certain number of men, that an officer can hope to be able to arrive rapidly at a right conclusion in the hour of need.

Offensive and Defensive.—It will be evident, that while modern fire-arms confer so great a power on the local defence, that they render it almost impossible for an attack to be successful, unless the defenders have been previously demoralized and their artillery overpowered by the fire of the assailants, they at the same time more than restore the balance by the facilities they afford to the attack of effecting the demoralization required by concentrating a superior artillery and infantry fire (which will have an effect both moral and material far above anything hitherto experienced in warfare) upon the spot selected for assault, and of directing a large force of infantry upon it from the first. On the other hand, the defenders will have a better knowledge of the ranges to be fired over than their opponents. The attacking General, however, possesses the great advantage of being able to choose his own place of attack; and if he succeeds in his attempt upon that particular point, he may almost feel assured of ultimate success, while the defenders are forced to guard the whole extent of their line, as they know not from

* Journal Royal United Service Institution, Vol. 23 page, 296.

† Ibid. Vol. 32, page 984.

whence the attack will come ; and failure to hold their own at any one point will entail disaster throughout the whole extent of their position. While the advantages of physical force may thus be said to have a decided leaning towards the side of the attack, the moral superiority conferred on the assailants is undoubted ; the fact of attacking of itself implies a feeling of superiority, while the first line at any rate, as it leaves its casualties behind it, necessarily escapes much of the demoralizing effect which the sight of the dead and wounded must always have on their comrades ; and this is an advantage which will tell very heavily with the young soldiers who will probably be found in large numbers in the battles of the future. The French Regulations say that the offensive alone permits the attainment of decisive results ; and they add that the best way of avoiding loss is to inflict it on the enemy. With this object in view, whenever a body of troops occupies a defensive position, it is a *sinâ-quâ-nou* that a counter-attack is carried out, whereas in our service such a method of procedure is practically almost unknown. Other Continental nations train up their soldiers in the same spirit, and while impressing on them the absolute necessity of fortification, both on the offensive and defensive, caution them against the dangers attending an over-use of it on the field of battle. In a brochure recently published, entitled "*La conduite des troupes à la guerre*," the following words occur, "Whoever wishes to measure himself against an adversary, should have at his heart an impatience to attack, and he should only see in the defensive a temporary evil." It may be urged that a superiority of force is essential to the side undertaking the offensive, but this superiority cannot always be ensured ;* and the balance of moral force is so decidedly on the side of the attack, that it alone would be sufficient to justify a general, whose forces are in other respects equal to those of his enemy, in deciding on such a course of action. It was said by Napoleon, that moral force is to material in the proportion of three to one ; and it is now more than ever certain that if a moral superiority can be obtained (and the use of the offensive will go far to ensure this), success can be confidently counted upon, provided that subsequent operations are carried out in accordance with the rules of modern warfare, and that no unnecessary risks are incurred during their execution.

Tools, Work, &c. —The experience of the past, dearly bought as it has been in the majority of instances, has brought home to all civilized nations the necessity for a sufficient supply of light entrenching tools being carried by the troops themselves, as in no other way can it be ensured that the ever varying circumstances of the moment can be satisfactorily grappled with and turned to good account. We have seen, that in the generality of cases the amount of time at the disposal of the General will be very limited, and the work of digging will have to be carried on constantly and without intermission in all parts of the

* General Dragomiroff says, that "in manœuvres for attack and defence, numbers must always be equalized, as in war one attacks and fights, not only with equal, but often with smaller, numbers. Troops must defend themselves by attacking, and must pay no attention to what one so often hears, *viz.* that the offensive is only possible with superior numbers."

field; it will also frequently happen during an attack, that even before the works are completed it will become necessary to abandon them, in order to make a further advance, when they must be recommenced anew in a fresh place. Moreover, as the engineers will always be inferior in number to those required for work of a more technical nature, it will become incumbent on the infantry to execute such works as may be necessary for their own safety with the tools that are immediately to hand, and it will therefore be of the utmost importance that a sufficient supply of the latter should always be available to meet every possible contingency. This will never be the case, unless the troops carry their own tools with them. The system of wheeled transport of tools, if adopted in its entirety, must result in failure, as it did in 1877, though as an auxiliary method it will always be useful, provided the nature of the country is favourable. Pack transport would better meet the necessities of the case, and this system was found to answer in 1877, both by the Turks and Russians. In Afghanistan during the last war, camels were found very useful, 100 tools (very heavy ones) necessary on account of the rocky nature of the country being carried per camel, in wicker crates. As we have seen, however, the necessity of rapidly throwing up shelter will, in the future, be so constant in all parts of the field, at one and the same time, that it will become imperative to provide each man with the means of entrenching himself at a moment's notice, and it would be courting disaster to expose a body of troops unnecessarily, even for the shortest possible time, to the enemy's fire, while they were awaiting the time (which would probably never arrive), when a sufficient supply of tools would become available for their being no longer required elsewhere.* Even should the tools belonging to these troops not have been otherwise appropriated, as an excuse of the exigencies of the moment, it would often be impossible to bring them up sufficiently far to the front, unless the ground was singularly favourable, and by the time they reached, if ever they did, the troops for whom they were intended, it would be found that few of the latter were left alive to use them. Recognising this fact, the Russians, immediately after the war with Turkey, issued the following portable entrenching tool to their troops, and their example has since been followed by Germany, Austria, and France, as well as by Bulgaria and several of the other minor Powers†. This tool was actively used by the Roumanians during the war of 1877, with the best possible results. In Russia, 80 small spades and 20 small axes are carried per company during war, and half of that number in peace time, while heavy entrenching tools under charge of the reserve, are completely unused. It is advantageous to use them in preference to the snapper, even in the case of a war footing a company of infantry in the French army carries 32 spades.

* During the Afghan war the necessity of such shelter, in general, the troops in the front line at a time. Much of the material was lost in the hands of the enemy.

† The Roumanian spade has a blade of 7 inches and a handle 12 inches long, weighing from 15 to 17 lbs. weight, the pickaxe has a head of 2 1/2 inches wide at the base, and a handle 12 inches long, weighing 10 lbs. The pickaxe has a head of 2 1/2 inches wide at the base, and a handle 12 inches long, weighing 10 lbs. The pickaxe has a head of 2 1/2 inches wide at the base, and a handle 12 inches long, weighing 10 lbs.

12 pick axes of sorts, 1 saw, and 1 shovel per battalion are employed, each man carrying 2 axes, 1 shovel, and 4 axes. In a German company there are 10 small pick-axes, and 5 axes are carried in a waggon per battalion, including spades, pick-axes, and axes. The tools are carried by the men,* while the material transport, per battalion, 150 lbs. besides cutting tools. The Wallace tool for ordinary trenches have been extensively used in the text books. Redoubts have been made for this sort of work they are not used for the earth any distance with them, and a great deal of labour so to employ them after the manner of the former, from 40 to 50 men are counted on in each relief of four or five hours, whereas with the latter from 20 to 30 men. We have seen that the work of the engineer is ordinarily confined to the construction of works with splinter-proof cover, the cutting down of trees, the case may be, of everything that is required for the defence from fire, and the making of gun-ammunition, the works will, as a rule, be made of earth, and shovellings, which will require a certain amount of cover in a minimum. The work will also frequently be required, and the tool is admirably suited.† The construction of the works, and the cutting down of trees, and for this work a plentiful supply of tools should be carried by a certain portion of the battalion. Major is of opinion that 20 per cent of the battalion carrying the tools, and the remaining 80 per cent carrying the tools.

Sword-bayonets will be much used in the construction of heavy works. For the construction of heavy works in rocky or mountainous country, heavy tools are required, the heavier they are, the better. It is no doubt, that the light picks are not carried by the battalion transport in our army, and the work that would be required of them is not done out with the portable tools, and it is not a heavy pick and shovel were in the hands of the men.

* The Wallace tool consists of a blade of 2 lbs. 4 oz. The blade of the spade is 1 lb. 10 oz. It is attached to the bayonet for use when lying down or in any other position.

† In 1877 the Roumanians threw up a line of works with their Linneman tools.

‡ Trials at Chatham have shown that a trench 14" thick in 20 minutes with a pickaxe and shovel.

§ Military Society Lecture, No. 14, page 14.

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field; it will also frequently happen during an attack, that even before the works are completed it will become necessary to abandon them, in order to make a further advance, when they must be recommenced anew in a fresh place. Moreover, as the engineers will always be inferior in number to those required for work of a more technical nature, it will become incumbent on the infantry to execute such works as may be necessary for their own safety with the tools that are immediately at hand, and it will therefore be of the utmost importance that a sufficient supply of the latter should always be available to meet every possible contingency. This will never be the case, unless the troops carry their own tools with them. The system of wheeled transport of tools, if adopted in its entirety, must result in failure, as it did in 1877, though as an auxiliary method it will always be useful, provided the nature of the country is favourable. Pack transport would best meet the necessities of the case, and this system was found to answer well in 1877, both by the Turks and Russians. In Afghanistan during the last war, camels were found very useful, 100 tools (very heavy ones) being necessary on account of the rocky nature of the country, being carried per camel, in wicker crates. As we have seen, however, the necessity of rapidly throwing up shelter will, in the future, be so constant in all parts of the field, at one and the same time, that it will become imperative to provide each man with the means of entrenching himself at a moment's notice, and it would be courting disaster to expose a body of troops unnecessarily, even for the shortest possible time, to the effects of fire, while they were awaiting the time (which would probably never arrive), when a sufficient supply of tools would become available to them, their being no longer required elsewhere.* Even should the tools belonging to these troops not have been otherwise appropriated, for the excuse of the exigencies of the moment, it would often be impossible to bring them up sufficiently far to the front, unless the ground was singularly favourable, and by the time they reached, (if ever they reached) the troops for whom they were intended, it would be found that few of the latter were left alive to use them. Recognising this fact, the Russians, immediately after the war with Turkey, issued the following portable entrenching tool to their troops, and their example has since been followed by Germany, Austria, and France, as well as by Belgium and several of the other minor Powers†. This tool was actually used by the Roumanians during the war of 1877, with the best possible results. In Russia, 80 small spades and 20 small axes are carried per company during war, and half of that number in peace time, while heavy entrenching tools, under charge of the reserve, are employed, wherever it is advantageous to use them in preference to the smaller ones. In a war footing a company of infantry in the French army carries 32 spades.

* During the American war the necessity of each battalion carrying the tools in its own cart was felt. Much suffering resulted from this practice.

† The Lieberman article has a table of 7 tools, and a handle 12½ long, the weight is from 1½ to 1½ lb, the width of the point is 1½ to 1½ inches, and the width of the blade is 2 to 2½ inches. The tool is to be carried in a bag, and the handle is to be 1½ to 1½ inches long, and 1½ to 1½ inches wide, it forms a convenient stand for boys of 12 years of age in working.

12 pick-axes of sorts, 1 saw, and 3 axes ; in addition to which, 4 mules per battalion are employed, each carrying 12 round shovels, 8 pick-axes, and 4 axes. In a German company of 250 men there are 100 small spades, 10 small pick-axes, and 5 axes carried by the men, and, in addition, there are carried in a waggon per battalion 111 large entrenching tools including, spades, pick-axes, and axes. In our service the Wallace entrenching tool is carried by the men,* while, in addition, there are carried as regimental transport, per battalion, 150 light shovels and 150 light picks, besides cutting tools. The Wallace tool is an excellent implement, and the ordinary trenches have been excavated with them in the time shown in the text books. Redoubts have also been thrown up with them,† but for this sort of work they are not well suited, as it is difficult to throw the earth any distance with them, and it would therefore be only wasteful of labour so to employ them after the large ones have come up ; as with the former, from 40 to 50 cubic feet of excavation only can be counted on in each relief of four or five hours, according to the soil, whereas with the latter from 20 to 25 cubic feet can be thrown out per hour. We have seen that the work of entrenching on the defence will in future be ordinarily confined to the making of deep shelter-trenches with splinter-proof cover, the cutting down, levelling, or filling up, as the case may be, of everything that affords cover either from view or from fire, and the making of gun-pits and epaulments ; while in the attack, the works will, as a rule, be rather in the form of shallow scratchings and shovellings, which will enable the troops to obtain a certain amount of cover in a minimum of time. Loop-holing and notching will also frequently be required, and for all this work the Wallace tool is admirably suited.‡ The construction of abatis and entanglements, and the cutting down of trees, will also frequently be necessary ; and for this work a plentiful supply of axes will be required, which should be carried by a certain proportion of the infantry. Captain Mayne is of opinion that 20 per cent would be sufficient for this purpose, the remaining 80 per cent carrying the Wallace tool.

Sword-bayonets will be much used for cutting down brush-wood and bushes. For the construction of heavy field works, and for all work in a rocky or mountainous country, heavy entrenching tools will be required, and the heavier they are, the better for the work. There can be but little doubt, that the light picks and shovels that are now carried as part of the battalion transport in our service, are of no use whatever for the work that would be required of them, as all the light work can be carried out with the portable tools, and it would be a great gain to efficiency if a heavy pick and shovel were introduced in their place. This of

* The Wallace tool consists of a shovel with pick and grubber, its weight being 2 lbs. 4 oz. The blade of the spade is 7" long, its total length being 30 inches. It is attached to the bayonet frog, and can thus be got at at any moment, and used when lying down or in any other position.

† In 1877 the Roumanians threw up some of the heavy siege works at Widdin with their Linneman tools.

‡ Trials at Chatham have shown that a man can make a loophole in a brick wall 14" thick in 20 minutes with a pick-axe, and a notch in 5 minutes. Aldershot Military Society Lecture, No. 14, page 13, by Major Savage R. E.

course is a question of weight, but it would be far better to carry 200 of the heavy tools per battalion than the 300 useless articles which would be taken on service according to present arrangements. Light entrenching tools should be carried by a portion of cavalry and mounted infantry soldiers as a part of their equipment, to enable them to clear away obstacles, destroy railroads and telegraphs, and rapidly to prepare localities for defence, which could then be held until the arrival of the infantry.

Conclusion.

We have now endeavoured to investigate the case, in which the light entrenching tool will be required on the field of battle. We have also seen, that while practice is absolutely necessary for officers to train themselves rapidly to select the parts of the ground to be strengthened, and to calculate the number of men and tools, as well as the time required, for the construction of the works they may decide upon, it has become equally necessary for them to train their men both theoretically and by constant practice with their tools in peace-time, to understand the value of entrenchments on the field of battle. This duty must be entrusted entirely to the company officers, who, in order to carry out the instruction thoroughly, must themselves realize the vast importance of the subject. They must understand, that if spades are put into the hands of their men for the first time at the critical moment, it is unreasonable to expect that full use will be made of them; while little or no better result will be attained if they merely take their men out during their training and make them dig for hours, apparently with no object. Let the officers first teach their men theoretically what are the high issues at stake, and then, when they understand thoroughly what is required of them, let them train them systematically and practically up to the high standard, which, in the present day, can alone be said to constitute efficiency.

Village fighting should be carefully practised, as we have seen how the French suffered in 1870 from a want of training in this respect. The men must be impressed with the fact, that the value of entrenchments depends, not so much on the shelter that they give to their occupants, as to the facilities that they afford to the latter to destroy their enemies; and that as it is by means of fire and the bayonet, and not by unduly taking advantage of cover, that they can hope to be successful in war, it should become a point of honour that every man leaves his shelter immediately the order to advance is given. Moral training has now become a matter of the utmost importance, as although the power of modern weapons has vastly increased, the soldier himself has received no corresponding increase of natural courage to enable him to withstand their demoralizing effects. It has been well said by a German officer, that "superior fighting power, resulting from the warlike training of both officers and men, from earnest and incessant training in discipline, sense of duty, pride of arms, and patriotism, offers the only guarantee, in spite of all improvements in the means of destruction and protection, of being able to cultivate the spirit of

the offensive in the art of war and tactics ; and eventually of crowning this spirit on the battle-field with the successful delivery of the attack.* In our service it has never been possible to carry out the system of moral training which is so highly appreciated on the Continent, since the training of the men was, until recently, never confided to the hands of the company officers, and it was impossible for the Adjutant, Sergeant-Major, and Drill Sergeant to do more than instil into the mind of the soldier that habit of unreasoning obedience, which, in the days of close order formations, fully answered its intended purpose. Now-a-days, however, when more is expected of the soldier, his moral education must be taken seriously in hand ; and in order to train him to the habits of strict discipline which are now more than ever necessary, his feelings of honour, self-respect, and patriotism, must be cultivated by every means possible. With this object in view, officers should teach their men the histories of battles in which their regiments have distinguished themselves, as well as of other events, such as the storming of Badajoz and Ciudad Rodrigo, in which the British soldier surpassed himself in his devotion to his duty. Such stories also as the burning of the troopship "Sarah Sands," and the wreck of the troopship "Birkenhead" off the Cape of Good Hope, would help to instil in their minds the fact, that in the British soldier of former days the feeling of discipline ever rose superior to that of the fear of death, and they would thus become impressed with the desire of emulating their forefathers in this respect, should the necessity for their so doing ever arise. There is no use in mincing or glossing over the matter of losses. They will have to be faced, and we must teach our men to face them, not by attempting to minimize the danger, nor by encouraging them to hide themselves behind every piece of cover that presents itself, but by showing them how to make a rational use of shelter under the orders of their officers, and then, when the time comes, to go into the assault with their hearts in the right place, being ready to die, if need be, for the sake of their Sovereign and their country

b. The most effective use, which can be made on a modern battle-field, of signalling.

"La Télégraphie par signaux est un corollaire de la Télégraphie électrique en campagne.....C'est pendant les loisirs de la paix que ces questions doivent être sérieusement étudiées, afin d' être prêts au jour de l' action." Général Prévost.

One of the points, respecting which a General commanding a force on active service will be most solicitous, is the establishment of a system of rapid communication between the several portions of his army ; in order that he may be able to obtain information with the least possible delay, respecting the position, numbers, and intentions of his enemy ; and then having matured his plans in accordance with the information so gained, that he may be able to transmit his orders with equal rapidity

*Lecture by Major Keim at Berlin, Journal Royal United Service Institution, Vol. 34 page 555.

to his subordinates, and to organize the many and varied movements which take place on the battle field, in such a manner, that they may all tend towards the accomplishment of the object which he has in view.

It stands to reason that a General who is thus kept in touch with every integrate part of his force, and is able to know from minute to minute their exact positions and circumstances, as well as what they can see; and who can obtain at the same time, from his points of observation, all the information he requires respecting his enemy, stands in a favourable position to deal the latter a crushing blow, or at any rate entirely to frustrate his intentions.*

The means of conveying such intelligence and orders consist of—

1. The electric telegraph.
2. Signalling.
3. Mounted orderlies and cyclists.

Mounted orderlies should be used to carry written messages for short distances, where no time would be saved by the employment of other means of communication, and it is recommended that they should be employed to carry orders to bodies of troops in motion.† The use of smokeless powder will, however, enable all movements to be so clearly discerned by the enemy, that this method of communication between bodies of troops under fire cannot but be regarded as most precarious. Cyclists will be employed principally in bivouacs or cantonments, and possibly with the rear echelons during an action.

The electric telegraph, as at present employed in our service, is intended as a means of communication between the base of operations and the head-quarters of the army, as well as between the latter and the head-quarters of army corps, or other units, including the cavalry division in cantonments, but not in action.

Signalling is of two kinds, viz., Aural and Visual. The first, consisting of foghorns and whistles, labours under the disadvantage of being able to sound only one note; and with the exception that whistles are employed to draw attention to movements and orders, it is practically useless on the battle-field.

Visual signalling is conducted by means of (1) Flags, (2) Heliograph, (3) Lime light, (4) Lamp, (5) Heliostat, (6) Reversing discs, (7) Collapsing Drum, (8) Shutter apparatus.

(1), (2), (3), and (4) are in general service use, (5) and (6) are in occasional use, and (7) and (8) are only used between permanent stations.

Methods of employment (a). Scouting or reconnoitring cavalry. The first party of signallers, viz., three men, is dropped within sight of camp, though as far away from it as possible, and opens communications with it by means of the heliograph if possible.‡ It also keeps up

* The Instructor of signalling in England has stated recently, that had it not been for disbelief in signalling, the disaster of Maiwand would have been reduced from a rout to an orderly retreat. (No. 33 Lecture, Aldershot Military Society 1891.) The remark would apply with equal force to Isandlwana.

† Manual of Instruction in signalling, page 2.

‡ The heliograph was first used for war purposes in the Lushai Expedition of 1871-72; and, whenever practicable, communication is carried out by its means, as it is much quicker and less fatiguing than flags, and also attracts less attention. If aligned by day, it can be worked by moonlight or by artificial lights.

communication with the advancing scouts from time to time, telling them what hills, &c., can be seen ahead of them from the post, and learning from them the exact direction in which they are going.* The scouts can thus be told where to leave their next signalling post; and in this way parties are thrown out up to the moment when the enemy's scouts or other advanced troops are observed. A retirement would be carried out in a similar manner.

(b.) Keeping the General commanding informed of the movements of the several units of his force, &c. Signallers are sent out with each brigade or detached force, and open communication with a permanent station establishment at head-quarters. If the General moves about, he should be accompanied by a flying signalling party of mounted men, but his chief staff officers should be left behind with authority to act for him during his absence. Every party of signallers has a distinguishing letter; and a list of the parties and their distinguishing letters is given by the officer commanding the signallers to each officer or non-commissioned officer in charge of a party; so that one party wishing to open communication with another has only to call it up with its distinguishing letter. It is an essential condition that the country should be hilly, or at all events not flat and wooded, as in such a case signalling becomes an absolute impossibility.

Flags can be read up to 15 miles.

Heliograph up to from 60 to 70 miles.

Lamps (oil and electric) up to 15 miles, (Begbie's up to 40 miles).

Lime light lamps up to 40 miles.

Signalling has been found most valuable when carried out between points when the intervening ground was held by the enemy, in which case a telegraph is of course utterly useless. For instance between Generals Roberts at Robat and Primrose at Kandahar (48 miles), during the march of the former from Kabul, also between Kabul and Lataband during the investment of Sherpur.

(c.) Staff or other officers may be posted to observe the enemy's tactics in observing stations or balloons, their observations being communicated to head-quarters by telephone or signalling. Balloons have frequently been used in war,† and recent improvements have rendered them very valuable in calm weather, but if they are exposed to a wind of 20 miles an hour, the motion of the car is too great to admit of useful observations being taken. They have been used during manœuvres, of late years, in France, Russia, and England, for the purposes of ascertain-

* In all signalling communications, compass points are invariably used.

† In the French revolutionary wars captive balloons were successfully used by the French at Maubeuge, Fleurus, and Liège; the results of the observations being reported by means of dropping a weighted letter to the ground. In the American war, balloons were frequently used. The earthworks raised by the Confederates for the defence of Richmond were observed from a distance of 8 miles from a balloon, 1000 feet above the ground, though their exact nature could not be clearly ascertained. The balloon was connected with head-quarters by telegraph, and General McClellan, was thus kept well informed of the progress of the subsequent battle, was enabled to select the most advantageous moment for the delivery of his attack.

the position and strength of the enemy (this can be done by night almost as well as by day, the number of watch fires being counted, and an average of ten men allowed for each fire), and whether their position is entrenched or not, and all important information regarding it. Also during an action, for observing the fire of the artillery and reporting its effects by telegraph, telephone, or signalling, to batteries. Signalling can be carried on from balloons by means of collapsible cones or moveable shutters by day, or by the alternate exposure and obscuring of a lime or electric light at night. In addition to the Powers above mentioned, Italy and Germany have also adopted balloons for military purposes.

(d). For keeping up communication ; (1) laterally, between columns of troops on the march, and (2) between different bodies of troops in action. It is considered that when troops are actually in contact, signalling may possibly be carried out between supports and reserves, but that between the fighting line and the supports it is an impossibility, since they are never stationary for any length of time, and signalling between bodies of troops on the move cannot be relied upon.

(e) For maintaining communication between the outposts and the main body, and between Advanced, Rear, and Flanking Guards, and the Main Body.

The occasions on which signalling will chiefly be made use of for tactical purposes on the battle-field may be briefly summarized as follows :—

The attack.—(1) For communication between the advanced guard or reconnoitring patrols, whether cavalry or infantry, and the headquarters of the army, both by night and day.

(2). During the action, between balloons, or other observing stations, and Head Quarters ; to give information regarding the enemy, and the positions, from time to time, of the contending forces, &c.

(3). Between balloons, or other observing stations, and the artillery, to give information regarding the effect of the fire of the latter.

(4). Between artillery and its escorts ; to give the latter, who will presumably be some 500 yards in front, or on the flank of the guns, notice of any intended movement, and so enable them to commence conforming to it in anticipation.

(5). Between the artillery or infantry preparing or covering an attack by fire, and the assaulting troops ; in order to ensure the fire of the former being maintained up to the last possible moment, and its cessation when it becomes dangerous to the latter. In case of curved or indirect fire being used by the artillery, it would be necessary to maintain communication between the assaulting troops and an observer, who must himself be in direct communication with the batteries, so as to be able to stop the fire and resume it when necessary.

(6) In a long line of guns, or where guns are dispersed, with the object of concentrating their fire ; between the officer commanding the artillery, and the different portions of his command.

(7) Between the infantry entrenched at a distance of some 600 yards from the enemy's position, for the purpose of engaging him along

his whole front, and so preventing him from massing troops to oppose the actual assaults*, and the General Commanding; in order that the latter may be informed as to the parts of the enemy's line where the fire has sufficiently decreased in intensity, to appear to justify an attack being made on them in force. If circumstances do not permit the use of the heliograph, reversing discs might be used for this purpose, as they would not be likely to attract the attention of the enemy.

(8.) Between the General Commanding and his subordinate commanders. It will be especially important that the former should be in constant communication, (1) with his reserves, in order that he can direct them toward the spots selected for the attack, and (2) with the troops that are detached to operate against the enemy's flanks, as by this means only can attacks on the front and flanks in extended operations be timed to take place simultaneously.†

(9.) As soon as any important localities, such as villages, farms, redoubts, &c. are captured, communication should be opened up between them and the General Commanding.

(10.) It is a fact that will hardly admit of doubt, that cases will frequently occur, both in the attack and defence, of (1) large gaps being left unintentionally between bodies of troops, (2) guns being left temporarily without escorts, or (3) infantry who have been subjected to a heavy fire, becoming for the time being demoralized and out of hand, &c. &c., which will afford opportunities for cavalry to act with great effect, provided only that the opportune moment be taken advantage of without an instant's delay; and as it will be absolutely necessary for the cavalry to remain hidden from the view of the enemy until required to act, the commander should invariably place himself in a position from whence he can watch the progress of the fight. He should be accompanied by signallers, and must be in direct communication with his command, so that when he considers the watched-for moment has come, his orders may be conveyed and acted upon without any delay.

(11.) Between the battalions and their regimental ammunition reserves, and between the latter and the divisional ammunition reserves; also between the guns of a battery and the 1st line of waggons, between the 1st and 2nd lines of waggons, and between the latter and the divisional ammunition reserves. If the army corps ammunition reserve is in the vicinity, communication should also be opened between it and the divisional reserves. Captain Benson, in his Prize Essay, recommends, that for purposes of replenishment of artillery ammunition, the French system of attaching non-commissioned officers belonging to the echelons in rear temporarily to those in front, should be carried out in its entirety (see April No. 1891, Vol. 35 R. U. S. I. Journal). Signal-

* Vide ante page 323.

† A most successful use of the field telegraph was made at the Aladja Dagh, where General Lazareff's turning column paid out a line as it pursued its march, which extended over 40 miles; the General was thus placed in direct communication with head-quarters during the battle that ensued.

would, however, be far more efficacious, provided a sufficient supply of signalling signallers were available.*

The Defence.—Numbers 1, 2, 3, 6, 10, and 11, will apply as in the attack.

(12.) Between the General Commanding and his subordinate commanders in the line of battle, and with his reserves; in order to enable the General to, as it were, feel the pulse of the fight, so that he can order his reserves to any place where their presence may be required; and also that he may be in a position to decide on the proper moment for passing from the stage of the defence to that of the attack, and issue his orders accordingly.†

(13.) Between the General Commanding and any troops that he may detach, as recommended by Von der Goltz, in order to be in readiness to fall on the exposed flank of the assailant, should the latter attempt a turning movement.

(14.) Between the General Commanding and any advanced or detached posts that may be occupied.

It will be at once apparent that the efficient carrying out of the above mentioned services will necessitate the establishment of an organized system of communication on a large scale, since the regimental signallers will be utterly unable to cope with the difficulties attending such an undertaking; and indeed, as a matter of fact, their time will be fully occupied in the maintenance of communication between the component parts of their own battalions, and with their regimental ammunition reserves. But it may naturally be asked, why has such an increase in the service of communication become a matter of necessity in these times?

The answer is, that the number of troops employed will be far greater than formerly, and that smokeless powder, while rendering the use of gallopers and mounted orderlies on the field almost impossible, has at the same time, increased the necessity of a system of rapid communication, since it will no longer be possible for a General to follow with his eye the course of an action, as indicated by the clouds of smoke advancing or receding; and therefore, if some such system is not established, he will be entirely in the dark as to the course events may be taking in parts of the field, other than those over which he can exercise

* Marshal Canrobert stated before the Bazaine Commission, that as his reserve ammunition had been left at Châlons, he had been unable to replenish his supply after the battle of the 16th August 1870. After the failure of the attack of the Prussian Guard on St. Privat on the 18th, he sent to warn the Commander-in-Chief that he was in want of ammunition; and on the renewal of the attack he again sent to warn him that he could not hold out much longer. *Procès Bazaine.*

† Signalling would have proved of infinite value, if communication could have been established between the two Prussian armies on the eve of the battle of Königgrätz, and maintained during the battle. Similarly, if signalling communication could have been established between Canrobert's hard-pressed corps and the French head-quarters during the battle of Gravelotte; and if Marshal Bazaine could have telegraphed or signalled his orders to the Imperial Guard, which was held in reserve, and to the ammunition reserves, supplies of the latter and reinforcements would, in all probability, have reached St. Privat in time to have changed the fortune of the day.

a personal supervision. It may also be argued, that the Commander-in-Chief is bound to abandon the direction of affairs from the time that he has once committed his masses to the fight. The answer to such an argument would be, that the obstacles are doubtless numerous and great, but the advantages arising from the fact that the ruling hand is able to control the movements of the various bodies of troops in such a manner as to avoid the occurrence of a series of disjointed efforts, and to ensure instead a system of mutual support, are so manifest,* while the difficulties of co-operation between the various bodies are so increased by the vast extent of the ground over which tactical operations will, in the future, generally extend, that in order to avoid disaster, every effort must be made to ensure the possibility of the power of communication being exercised efficiently throughout the whole course of the action.

The adoption of smokeless powder has greatly increased the difficulty of maintaining such communication, since the signallers of the infantry will no longer be hidden by a pall of smoke from the view of the enemy, who will thus be enabled at times to read the messages as they are sent. Parties of signallers accompanying machine guns and artillery, will, however, not be subject to this drawback, or at any rate, only to a minor extent, since a certain amount of steamy smoke arises from the discharge of these weapons which will sufficiently obscure the flags. To avoid this disadvantage, the French have adopted a new method of signalling in the field, by means of an oil lamp reflected on to a concave disc. This apparatus works equally well by day and night; and they claim to have arrived at very satisfactory results with it during the late manœuvres. During the American War, telegraphs were largely used, not only for strategic, but also for tactical purposes, the operators frequently working in the fore-front of the battles, under the hottest fire. At Gaine's Mill, General Porter's operators continued to use the wires, under a heavy fire, as his force was retiring, and by this means reinforcements were enabled to reach him at the critical juncture. When General Sherman, in front of Kenesaw, was about to attack General Johnston, he caused a space to be cleared, and had the telegraph wires laid to it; and being thus in communication with all parts of his army, he was enabled to regulate the course of the battle, and bring it to a successful issue.

At Spotsylvania Court House, (where at one time the Federal operators were actually working the cables within the Confederate lines), and during the later stages of the war generally, reels of insulated cable, strong enough to resist the wheels of gun-carriages, were carried on the backs of mules, the wire being paid out over the field and then raised on trees or large boughs; and this plan was found most useful in action.† General Sherman was of opinion that telegraphing was of more use on the battle-field than signalling by flags and torches. It must, however, be remembered that the American operators were exceedingly good, and

* Take for example the battle of Woerth in its different stages, before and after the arrival of the Crown Prince on the field.

† Telegraphing in battle. The Century Magazine, 1889, Vol. 38 page 792.

that the country was, on the whole, better adapted to the telegraph than to any other method of communication.

It has been proposed in England to establish a light field-telegraph for use on the battle-field ; in favour of which it is claimed, that it will enable messages to be sent and received while both stations are on the move, that the operation will be completely concealed from view of the enemy, that messages can be sent more rapidly than by other means, while communication will be affected neither by the weather nor by the configuration of the ground ; and as no transmitting stations will be required between the two terminals, the labour will be reduced to a minimum. No vehicles will be employed ; the cable, which will be divided into lengths of half a mile, being coiled in hanks and carried by the men like rolled great coats ; a light collapsible reel, 5 lbs. in weight, being used for the purposes of paying out and picking up.*

The great disadvantages of this, or any other system of telegraphy, are, that it would be inapplicable in cases where the enemy is in possession of the ground intervening between any two stations, that the lines would require to be guarded throughout, repairs would be frequently necessary, and a highly trained *personnel* would be required, which is not the case with visual signalling, the apparatus in connection with which possesses the advantages of cheapness and simplicity. Such a field telegraph as that above mentioned would have to be worked by the battalion signallers, or by the men of a corps detailed for service with the army, who would therefore have to be instructed in telegraphy in addition to their other work ; and it is a question whether such instruction would be feasible under the present system, since the time of the men is already fairly occupied ; and if they are expected to devote their leisure to the study of telegraphy, some additional inducements must undoubtedly be forthcoming. The advantage of all signallers being so instructed would be very great, since in addition to their being able to work a light field telegraph during an action in places where the ground does not adapt itself to signalling, and for other tactical purposes, they would also be enabled to deal with local telegraphs, inter-communication between bodies of troops, telephone exchanges in camps, &c. ; and the telegraph battalion would thus be free to carry out its proper duties as defined on page 336.† The use of the telegraph in action must not be allowed in any way to supersede that of visual signalling ; and every effort must be made to maintain the latter system in a state of thorough efficiency, as upon it must fall, under ordinary circumstances, the brunt of the tactical work of maintaining communication‡

* Vide Lecture No. 20 Aldershot Military Society 1889.

† The Telegraph battalion in England consists, if fully mobilized, of 8 sections, each of which is provided with 100 miles of telegraph apparatus, which is considered sufficient for two army corps.

‡ Until quite recently the Germans would have nothing to do with visual signalling, as they considered that their field telegraph and mounted orderlies would suffice for all purposes. The present Emperor, however, was greatly impressed with the signalling arrangements at Aldershot, and he obtained a complete set of signalling apparatus as used in our service, with the result that the system has now been introduced into the German army in its entirety.

in action. The establishment of signallers for a battalion of infantry and a regiment of cavalry in our service, consists of one officer, two non-commissioned officers, and four privates, and one officer, two non-commissioned officers and eight privates, respectively, while at least one supernumerary per troop or company must be trained, in addition, to replace casualties. There is no establishment allowed for field batteries, although, as we have seen, the question of the necessity of communication in connection with the service of artillery in action is one of vast importance; and in several instances, such as 3, 5, 6, and 11,‡ the signallers employed should be gunners. This omission should be rectified.

It is now recognized that the duties required of regimental signallers in the field are so numerous and constant, that it would be impossible to carry them on efficiently, if men were taken away from their regiments for service elsewhere. For this reason a special signalling corps was raised for service during the war in Egypt, where it proved most useful; and a similar corps has now been organized in England for duty with the 1st Army Corps in time of war. The corps as at present organized would consist of officers and men belonging to regiments that are not in the 1st Army Corps; and the system is therefore faulty, since it deprives these regiments of their signallers, and therefore would render them inefficient, if it afterwards became necessary to despatch them, either to the same seat of war, or to other parts of the world. At the same time it is an undoubted fact, that the force available to carry out the signalling duties must be very considerable; and as the men composing it must be thoroughly efficient in their duties, (for a bad signaller is totally unreliable, and is therefore worse than useless), it has been deemed advisable in England, that, for future service, a corps of signallers belonging to the volunteers should be mobilized for duty in the field. Already there are some 500 members of that force, who have qualified as efficient signallers, a large number of whom are in receipt of the retaining fee which binds them to come forward when required; and as they are for the most part, exceedingly intelligent men, it would not be a difficult matter to render them sufficiently proficient in telegraphy, to enable them to work a light field line in addition to their signalling duties.

In India the members of the volunteer force could not perhaps be spared to go to the front in case of war; but we have, should we care to use them, excellent materials for the creation of a signalling and telegraph corps in our Eurasian population, who, although not as a rule physically strong enough for work that would entail much manual labour, are yet possessed of great endurance and are naturally very quick and intelligent. At the present time it is exceedingly difficult for young Eurasians to obtain employment; since well educated natives are willing to work the whole day as clerks for far less money than would serve to feed men of European descent. Large numbers of these men are, at the present moment, ready and willing to enlist; and the formation of Eurasian regiments is being urged in all parts of the country. The Madras Government has, it is said, expressed itself in favour of the movement,

‡ Vide ante, pages 338 and 339.

and the question is one that must of necessity be brought before the Government of India at a very early date. The principal difficulty, apart from that of finance, is to decide on the kind of work that would be most suitable for men of this class, but there can be no doubt that, for signalling purposes, they would be excellently adapted; and as there would be an ample supply of material to hand, it would take but a short time, were the formation of a signalling corps of Eurasians authorized in each Presidency, before one of the most serious defects that exists in the army of India would be virtually blotted out. It would only have to be explained that the force would be looked upon in a measure as a *corps d'élite*, and that it would always be employed at the front in time of war, and men would come forward in sufficient quantities to enable us to obtain the pick of those most suitable for the work required. The recruits should be taught to ride, as signallers should always be mounted on ponies during a march, in order that they may be fresh enough at its close to carry out their duties efficiently. They should also be taught to work by the compass, and they should be drilled to the use of their weapons, at any rate to a sufficient extent to enable them to defend themselves if attacked. The officers of the corps should be specially selected; and the divisions of which it would be composed, should be invariably employed at the winter concentrations of troops; while as constant practice would be necessary to enable the men properly to perform their duties, they need never be allowed to lapse into idleness during the summer months. Above all things, the divisions should never be broken up, the men should be kept to their duties, and on no account sent off to work in telegraph offices, as in that case they would rapidly deteriorate. Every effort must be made to raise the "morale" of the force, and to establish a feeling of "*esprit de corps*" and if due care is taken that telegraphy is regarded only as a useful and necessary adjunct to, and not as a substitute for, signalling, a force will have been raised, which will greatly increase the efficiency of the army in India, and will go far towards rendering it the most perfect fighting machine in the world.

The following System of Orthography for Native Names of Places adopted by the Council of the Royal Geographical Society, the Foreign and Colonial Offices, Admiralty, and War Office is to be adhered to in all Intelligence Division Publications.

1. No change is made in the orthography of foreign names in countries which use Roman letters : thus Spanish, Portuguese, Dutch, &c., names will be spelt as by the respective nations.

2. Neither is change made in the spelling of such names in languages which are not written in Roman character, as have become by long usage familiar to English readers : thus Calcutta, Cutch, Celebes, Mecca, &c., will be retained in their present form.

3. The true sound of the word as locally pronounced will be taken as the basis of the spelling.

4. An approximation, however, to the sound is alone aimed at. A system which would attempt to represent the more delicate inflexions of sound and accent would be so complicated as only to defeat itself. Those who desire a more accurate pronunciation of the written name must learn it on the spot by a study of local accent and peculiarities.

5. *The broad features of the system* are :—

(a) That vowels are pronounced as in Italian and consonants as in English.

(b) Every letter is pronounced, and no redundant letters are introduced. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai, au, ei*.

(c) One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

6. Indian names are accepted as spelt in Hunter's Gazetteer of India, 1881.

The following amplification of these rules explains their application :—

Letters.	Pronunciation and Remarks.	Examples.
a	<i>ah</i> , a as in <i>father</i>	Java, Banána, Somáli, Bari.
e	<i>eh</i> , a as in <i>fate</i>	Tel-el-Kebír, Oléleh, Yezo, Medina, Levúka, Peru.

Letters.	Pronunciation and Remarks.	Examples.
i	English <i>e</i> ; <i>i</i> as in <i>ravine</i> ; and sound of <i>ee</i> in <i>beet</i> . Thus, not <i>Ferjee</i> , but	Fiji, Hindi. Tokyo.
o	<i>o</i> as in <i>mote</i>	
u	long <i>u</i> as in <i>flute</i> ; the sound of <i>oo</i> as in <i>boat</i> . <i>oo</i> or <i>ou</i> should never be employed for this sound Thus, not <i>Zooloo</i> , but <i>All vowels are shortened in sound by doubling the following consonant</i> Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	
ai	English <i>i</i> as in <i>ice</i>	Shanghai.
au	<i>ow</i> as in <i>how</i> Thus, not <i>Foochow</i> , but	
ao	is slightly different from above	
aw	as in <i>law</i> .	Fuchau. Macao.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from <i>ey</i> in the English <i>they</i> .	
h	English <i>b</i> .	
c	is always soft, but it is so nearly the sound of <i>s</i> that it should be seldom used. If <i>Celêbes</i> were not already recognised it would be written <i>Selêbes</i>	Celêbes.
ch	is always soft as in <i>church</i>	
d	English <i>d</i> .	
f	English <i>f</i> . <i>ph</i> should not be used for the sound of <i>f</i> Thus, not <i>Hai-phong</i> , but	Haifong, Nafa. Galápagos.
g	is always hard. (Soft <i>g</i> is given by <i>j</i>)	
h	is always pronounced when inserted.	
hw	as in <i>what</i> ; better rendered by <i>hw</i> than by <i>wh</i> , or <i>h</i> followed by a vowel, thus <i>Hw my ho</i> , not <i>Whang ho</i> , or <i>Hwang ho</i> .	Hwang ho, Ngan hwi.

* The *y* is retained as a terminal in this word under Rule 2 above. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
j	English <i>j</i> . <i>Dj</i> should never be put for this sound.	Japan, Jinchuen.
k	English <i>k</i> . It should always be put for the hard <i>c</i> Thus, not <i>Corea</i> , but	Korea.
kh	The Oriental guttural ...	Khan.
gh	is another guttural, as in the Turkish... ..	Dagh, Ghazi.
l	} As in English.	
m		
n		
ng	has two separate sounds, the one hard as in the English word <i>finger</i> , the other as in <i>singer</i> . As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in <i>loophole</i>	Chemulpho, Mokpho.
th	stands both for its sound in <i>thing</i> , and as in <i>this</i> . The former is most common.	Bethlehem.
q	should never be employed; <i>qu</i> (in <i>quiver</i>) is given as <i>kw</i> . When <i>qu</i> has the sound of <i>k</i> as in <i>quoit</i> , it should be given by <i>k</i> .	Kwangtung.
r	} As in English.	
s		
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v		
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x	}	
y		
	is always a consonant, as in <i>yard</i> , and therefore should never be used as a terminal, <i>i</i> or <i>e</i> being substituted as the sound may require. Thus, not <i>Mikindány</i> , but not <i>Kwaly</i> , but	Kikáyu. Mikindáni. Kwale.
z	English <i>z</i>	Zulu.
zh	The French <i>j</i> , or as <i>s</i> in <i>treasur</i> ...	Muzhdaha.

Letters.	Pronunciation and Remarks.	Examples.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress, which affects the sound of the word, it should be marked by an <i>acute</i> accent.	Tongatábu, Galapagos, Paláwan, Saráwak.

N. B.—These rules were revised and approved by the Council, Royal Geographical Society, 11th December 1891.

INTELLIGENCE DIVISION, W. O.,
January, 1892.

CUTTINGS FROM RUSSIAN NEWSPAPERS.

(Communicated by the Asst. Qr. Mr. General, Intelligence Branch.)

Novoe Vremya, 6th April.—A Lecture was given by General Kuropatkin in St. Petersburg yesterday. It was divided into two parts.

1.—A general military statistical sketch of Turkomania, the relations of the Russians with the tribes; the campaign of 1879, the causes of its failure, Skobelev's preparations for the 1880 campaign, viz. the construction of communicating posts and a base of operations.

2.—The three weeks siege of Geok Tepe, ending with its capture by assault and the subjugation of the country.

The lecturer laid great stress on the immense advantage of a strong-willed commander, resolved to win or perish; showed how important in war is the use of *cold steel*, instancing the charges of the Turkomans in the face of heavy fire; remarked that those theorists who thought the days of *l'arme blanche* were over beside the present weapons of precision, would find themselves grievously mistaken. He also insisted on the necessity of night attacks, and said that general would gain an enormous advantage, who was the first to employ this method of warfare.

The lecture hall was crowded with an attentive audience of the most distinguished officers in St. Petersburg.

Russki Invalid, 1st April.—The use of the spade in the attack. (translated from No. 240 of *Jahrbücher für die deutsche Armee und Marine*.)

The experiences of the Russo-Turkish war first directed attention to the possibility of using the spade in the attack.

Many people object to it, owing to the difficulty that would be experienced in getting the men to leave their trenches for a further advance. The author thinks energetic commanders ought always to be able to overcome that difficulty.

Other people say the spade ought always to be used in every attack in all phases of it.

He does not agree with this view either, because,

(1.) to work with the spade 600 metres from the enemy and nearer, under a heavy and smokeless fire, is quite impossible, especially as, owing to the increased penetration, the earthwork must be very thick to be of use.

(2.) The advantage of fire won by the attackers in this way by great sacrifices would be again lost, as half the riflemen would have to be working with the spade, and besides that the freshly turned line of earth gives an excellent mark for rifles and artillery to aim at and judge their shots by.

(3.) The attacker, as soon as he stops and begins to dig, sacrifices the moral superiority of the attacker over the defender.

(4.) It gives the defender time to draw his reserves to the threatened point.

(5). In attacking a fortified position, infantry cannot hope to inflict any very serious loss by their fire, therefore there is no object in stopping to dig.

The author in conclusion draws up the following rules :—

(1). Don't resort to the spade necessarily in every attack.

(2.) The order to entrench should come from the commander only.

(3.) Only to be used in those phases of the attack which are of a defensive nature, *i. e.* to cover artillery, and for the original line of attack ; also where it required to keep the enemy back in the position occupied by him, during the execution of a turning movement ; also in flank positions or commanding positions, from which a fire is maintained on the enemy during the attack.

** Experiments with Felt Tents.*

The Invalide, 12th March.—The details of the construction of these tents were shewn in *Invalide* No. 36 of 1892.

The tent holds 32 men ; it is heated by a wood fire, and is perfect protection if in a sheltered spot, and the cold outside is not more than five degrees Reamur. But if on an open plain with a strong wind, a wall of snow must be built up outside, and the fire must be kept up well. The conclusion arrived at is, that with these tents, troops can camp out in the field in winter, as they are sheltered from cold, wind, and weather.

** Experiments with bivouacking tents.*

The Invalide, 13th February.—On referring to No. 36 to obtain details of the construction of what were termed "*Felt tents*," it appears that these are made of the pieces of the soldiers' tents.

Referring to Captain Grierson's "Armed strength of Russia," each soldier carries one half of a *tente d'abri*. This is presumably made of canvas : it is a piece 5' 6" by 2' 10½"; he also carries one pole (4' 7½") and one rope. It is out of these pieces that the above mentioned tent is improvised, as follows :—Eight strips or pieces are laced together by the ends of the cords, leaving an opening in the middle. These are then raised up on props, the ends of which are thrust through the opening.

This forms the roof of the hut or tent.

Then 16 pieces are laced round to form the walls, which are drawn into a slanting position and pegged to the ground.

The tent is then surrounded by a wall of trodden snow covering the lower parts of the strips. The entrance is formed on the lee side of the tent by a strip hanging loose. In the middle of the hut is a log fire, round which are spread straw mats with the men's knapsacks as pillows. The first time it took 17 minutes to pitch, but with practice it can be done much quicker.

New method of swimming horses.

The Invalide, 22nd April.—Skobelev's orders in 1882 were, Cavalry are to cross rivers as follows :—

* See Journal of United Service Institution of India, No. 93, 1892, page 222.

1. If the river is small, the men's kit, arms, and saddlery go over in boats and rafts, and the men swim with their horses.

2. If the river is large and swift, the men go over in boats with their kit and saddlery, towing their horses after them.

3. If there are no boats or rafts, a detachment of the best swimmers, with their rifles, ammunition, and entrenching tools hung round their necks, swim across with a rope, by means of which the other men pull themselves across. The horses, with their bridles hooked over the cantle of the saddles, are then driven over *en masse*.

The new method is invented by a Serjeant, and consists of a bag of canvas soaked in some waterproof mixture, and capable of being hermetically sealed. This bag weighs over 2 lbs., and is $4\frac{1}{2}$ feet long by $2\frac{2}{3}$ feet broad.

Into this bag are put the man's clothing, arms, and saddlery, and it appears that the bag filled with all these things and hermetically sealed not only does not sink, but will bear a certain amount of weight. To one of the ends of the bag is tied a rope with a slipknot. The possession of such an article, even if there were only a few in each squadron, would greatly facilitate the passage of cavalry across broad rivers.

This was tried on the river Suprasl near Bieloctok with complete success, the man holding his horse by the mane, and putting the noose of the bag over his shoulders.

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Recursive characters	Equivalents	Remarks
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<i>γ</i>	<i>u</i>	<i>oo, in boot</i>
<i>Φ</i>	<i>f</i>	
<i>x</i>	<i>kh</i>	<i>ch, in Loch</i>
<i>Π</i>	<i>ts</i>	
<i>ν</i>	<i>ch</i>	
<i>III</i>	<i>sh</i>	<i>*shch, in Parish church</i>
<i>III</i>	<i>shch*</i>	<i>*Omit in transliteration</i>
<i>б</i>	<i>mute</i>	
<i>bl</i>	<i>{ u z</i>	<i>in middle of a word at end . . .</i>



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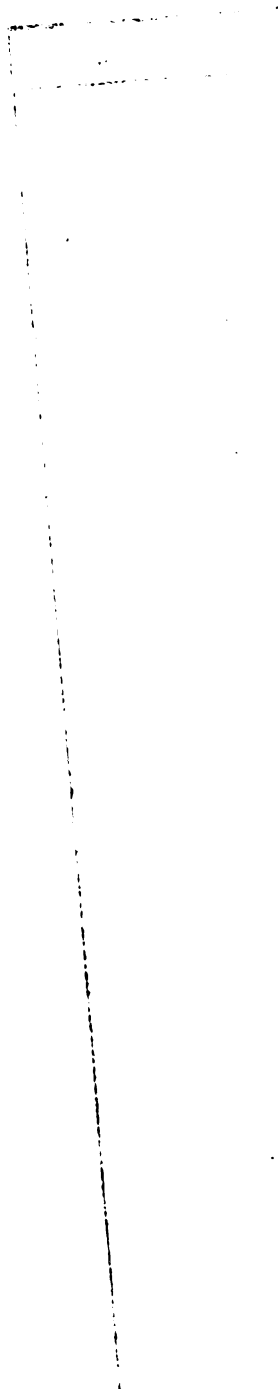
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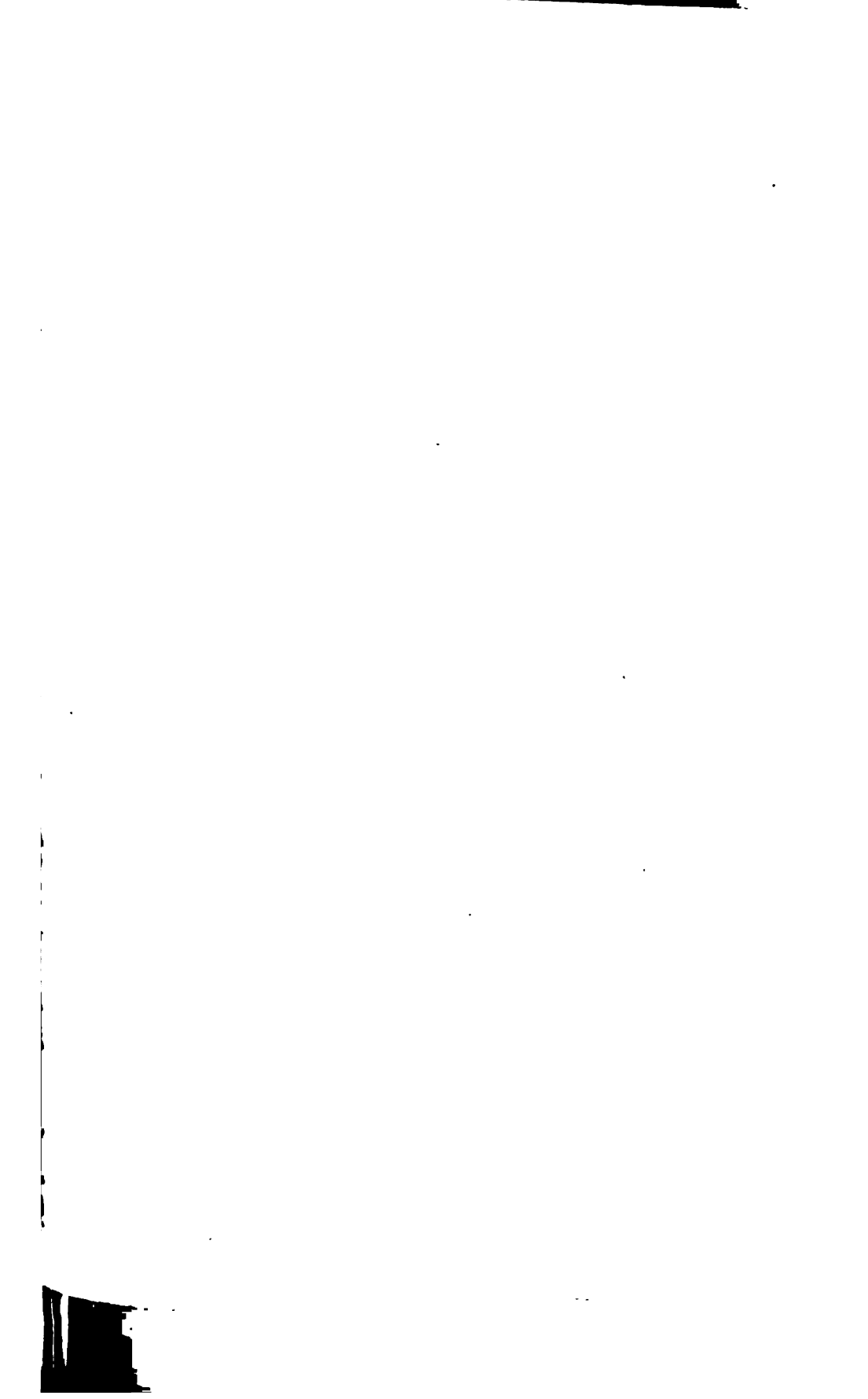
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DIVISION, WAR OFFICE.

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List of New Members joined during May June and July 1892.

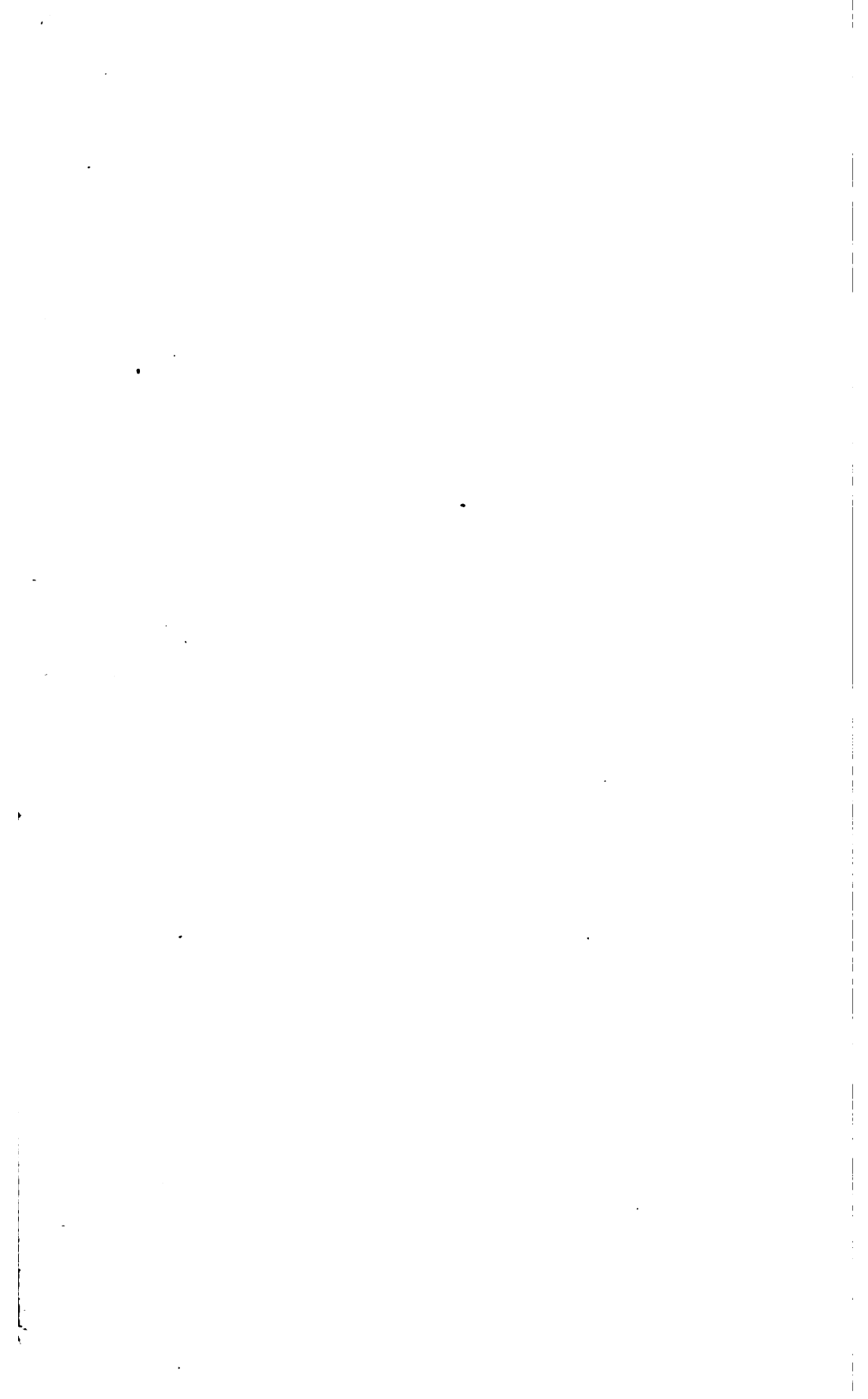
Rank.	Name.	Corps.
Captain ...	Anderson, C. C. ...	26th Punjab Infantry.
Captain ...	Anderson, J. H. A. ...	Manchester Regiment.
Major ...	Archer-Chapman, L. J. ...	R. A.
Colonel ...	Atkinson, J. R. B. ...	1st Punjab Cavalry.
Captain ...	Bunbary, W. E. ...	25th Punjab Infantry.
Colonel C.B. ...	Barton, G. ...	Royal Fusiliers.
Captain ...	Batten, A. C. ...	D. A. A. G.
Captain ...	Brown, J. A. ...	37th Dogras.
2nd Lieut. ...	Browne, H. J. P. ...	K. O. S. Borderer's.
Major ...	Brunker, H. M. S. ...	R. A.
Captain ...	Carnegy, P. ...	2-4th Goorkhas.
Br.-Genl. C.B. ...	Channer, G. ...	Comdg. Assam Dist.
Lieutenant ...	Cole, E. H. ...	11th Bengal Lancers.
Captain ...	Cox, H. V. ...	21st Madras Pioneers.
Lieutenant ...	Currie, R. H. M. ...	2nd Sikh Infantry.
Colonel ...	deLatour, E. J. ...	R. A.
Lieutenant ...	Dill, W. ...	Adj't. Midland Rifle Volrs.
Lieutenant ...	Dockerill, R. C. ...	2nd P. V. R. C.
Captain ...	Fegen, M. F. ...	R. A.
Lieutenant ...	Forestier-Walker, C. E. ...	R. A.
Major General	Frankfort de Montmo-	
Viscount ...	rency ...	Comdg. Lahore District.
Br.-Genl. C.B. ...	Gossett, M. W. E. ...	Comdg. Mandalay Dist. (Life Member.)
Captain ...	Gough, S. C. ...	5th Bengal Cavalry.
Lieutenant ...	Greenhill-Gardyne, A. D. ...	Gordon Highlanders.
Colonel ...	Handcock, A. G. ...	Staff Corps.
Captain ...	Heaven, F. G. ...	B. B. and C. I. Ry. Volrs.
Captain ...	Hovell, H. de B. ...	Worcestershire Regt.
Lieutenant ...	Jacob, C. W. ...	24th Baluchistan Regt.
Colonel ...	Jeffreys, P. D. ...	A. A. G. Quetta.
Captain ...	Kitson, G. ...	Kings Royal Rifles.
Major General		
K.C.B. C.S.I.	Lockhart Sir W. S. A. ...	Comdg. P. F. F.
Captain ...	McCarthy, C. A. ...	19th Punjab Infantry.
Major ...	Malet, J. W. ...	Northd. Fusiliers.
Captain ...	Maunsell, G. W. ...	Royal West Kent Regt.
Captain ...	Miller-Wallnut, C. C. ...	Gordon Highlanders.
Lieutenant ...	Milne, G. F. ...	R. H. A.
Major ...	Morrison, R. H....	18th Hussars.

Rank.	Name.	Corps.
Lieutenant ...	Murray, S. ...	Gordon Highlanders.
Captain ...	Parsons, J. H. ...	7th Bengal Cavalry.
Lieutenant ...	Pigou, F. H. ...	1st Infantry H. C.
Captain ...	Pinney, R. J. ...	Royal Fusiliers.
Lieutenant ...	Prowse, G. W. F. ...	Duke of Cornwallis' L. I.
Captain ...	Robertson, E. E. ...	C. I. Horse.
Captain ...	Robinson, J. G. ...	2nd Goorkhas.
Captain ...	Rowe, H. J. A. ...	19th Madras Infantry.
Colonel ...	Swinton-Skinner, E. ...	S. C.
Lieutenant ...	Vaurenen, G. R. ...	16th Bengal Infantry.
Captain ...	Wilmott R. Eardley, ...	R. H. A. (Life Member.)
Major ...	Wintour, F. ...	Royal West Kent Regiment.
Major ...	Wrench, A. J. C. ...	Royal Welsh Fusiliers.
Captain ...	Wright, G. ...	R. A.

List of Books added to Library.

Subject,	Author.	Vol.	Date of books.
Letters on Infantry (Prince Kraft)	Translated by Colonel N. L. Walford	1	1889
Foreign Manœuvres	Official,	1	1892
U. S. Geological Survey Vol. X. Part I and II.	J. W. Powell,	2	1888 & 1889
Handbook of the Turkish Army	Captain C. E. Callwell,	1	1892
The Region of the eternal fire	C. Marvin,	1	1884
Russian Central Asia	H. Lansdell,	2	1885
Proceedings Royal Engineers Institute No. 1	Captain J. G. Booth,	1	1878
Ditto ditto ditto No. 2	Lieutenant H. L. Jessep, R. E.	1	1878
A Race with the sun	Captain H. Harrison,	1	1889
Reconnoitring in Central Asia	C. Marvin,	1	1885
Letters on Artillery (Prince Kraft)	Colonel N. L. Walford,	1	1888
Notes on Goorkhas	Captain E. Vansitart,	1	1890
Imperial Defence	Sir C. W. Dilke,	1	1892
History of the Second Punjab Cavalry*	Official,	1	1888
Persia and the Persian question	Hon. G. N. Curzon, M. P.	2	1892
The British Navy Part I	Sir J. Brasey,	1	1882
Field work, appendices and plates	Colonel C. Brackenbury R. A.	1888

* Presented by Brigadier-General F. Lance C. B.



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VOL. XXI.

1892.

No. 98.

At Secunderabad on 24th June 1892.

**THE BEARING OF RECENT DEVELOPMENTS IN THE MEANS
OF DESTRUCTION ON THE MEDICAL SERVICES IN
TIME OF WAR,**

By Surgeon-Captain F. P. NICHOLS, M. S.

In appearing before you to read a paper with so formidable a title,

Proem.

I trust it may be allowed me to disclaim any special knowledge of the subject, and to urge that my province is only to open a discussion, leaving it to others with wider experience to give us their views and opinions. My efforts will be limited to bringing before you the main points on which, as I think, arguments will hinge, and thus trying to limit the differences with which a discussion on a wide subject is always threatened.

The main ends for which experts have lately been striving, in connection with my subject, seem to be the following :-

Objects of late inventions.

1st. Concealment of fire by the use of smokeless powder.

2nd. Increased effectiveness of rifle fire by weapons of longer range.

3rd. Carriage of an increased number of rounds by diminution in weight of cartridges.

4th. The concentration of fire by means of repeating or magazine arms.

It will be my duty to point out what effects these innovations may

Objects of lecture.

have on the number of wounded in future wars, on the distribution of wounded, and on the severity of wounds; as also what changes in the services for transport or treatment of the wounded may be rendered necessary in consequence.

In doing this I need, I think, only allude to what is grimly called

Limitations of subject.

civilised warfare. In battle with foes equipped less up to date than ourselves, such for instance as we meet with on our Indian frontiers, the advantage

of these innovations will, it seems to me, be entirely in our favour—the moral effect of a hailstorm of bullets, suddenly delivered from an unknown quarter, appears to outweigh the possibly lessened stopping power of the smaller projectile, and the protective action of smoke. Thus it seems reasonable to assume that the proportion of our wounded will not be greater, and although that of the adversary will, on the same shewing, be more, we have not yet reached to such a pitch of philanthropy as to provide extra ambulance for their needs. In the matter of arms also I shall confine my remarks to the rifle, as it is well known that the greater proportion of casualties are caused by this weapon (about 63 p.c.), and although probably the new explosives will add to the number and gravity of wounds caused by large projectiles, no special changes in character need be anticipated.

I believe that Surgeon-Major Bourke, M. S., last year gave you such a lucid description of the means laid down for the removal and treatment of the wounded in war, that I need do no more than remind you of:—

‘The first line of medical assistance’ composed of ‘regimental bearers’ and ‘bearer companies,’ extending from the fighting line to the ‘collecting station;’ and ‘the second’

Cursory sketch of lines of assistance. from the ‘collecting station’ by the aid of wheeled transport through the ‘dressing station’ to the ‘field hospital;’ and it will be remembered, that the more important point in the end line was the ‘dressing station,’ where the wounded first have their injuries thoroughly examined, and where urgent operations may have to be performed.

It is of the first importance to have this ‘dressing station’ at once out of actual fire and as near the fighting line as possible, in order on the one hand, to have leisure and opportunity to tend the wounded without the disquieting effects of bullets, and on the other, to shorten as far as possible the transport of badly wounded men to the nearest point of effective aid. This distance has been estimated at about 1,000 yards from the ‘collecting station,’ which should itself be immediately in rear of the 3rd line of the attacking force, say 1,500 yards from the firing line; thus bringing the ‘dressing station’ within 2,500 yards of the firing line.

It is evident that any change involving the movement of the ‘dressing station’ towards the rear, thus increasing the distance between it and the ‘collecting station,’ must necessitate a longer journey for the wounded, and also, if a continuous stream of carriage is to be kept up, an increase in the number of ambulances and personnel. The ‘collecting station’ being necessarily more or less under fire can scarcely be affected, except that possibly some operations of an extremely urgent nature may have to be performed there, owing to the added risk of carriage to the dressing station.

I am scarcely competent to speak of the effects of the use of smokeless powder and tactics. No campaign has yet been fought in which it has been used, and the experiments of continental autumn manœuvres of the last

two years tell us little except of its puzzling effects. According to the *Times* correspondent at the Austrian manœuvres last year, the results were most bewildering;—whole brigades annihilated without knowing the direction from which they were attacked; heavy artillery fire represented by a mere film of smoke; and the Berlin correspondent of the *Morning Post* speaking of the German manœuvres of 1890, remarks on its demoralizing effect on the enemy and the greatly increased certainty of aim, leading to increase in the fighting area and destructiveness at longer ranges. The very interesting Prize Essay of the 'Royal United Service Institution' for 1891 is well worth reading in this connection. It is a most exhaustive analysis of the possible changes of tactics resulting from modern weapons and explosives, based on the latest continental field manœuvres, but, as the author admits, the whole question is very problematical.

At all events, I think it will be allowed, that the dangerous area must be increased; that fighting will take place over an extended line of country; and that absence of smoke will cause the aim to be more accurate at the longer ranges and infinitely more deadly at the shorter; that briefly the tendency will be to increase the number of wounded over a larger area, and so render it more difficult than ever to afford effective relief.

I now come to speak of the general use of rifles of comparatively small bore, carrying small hardened bullets, having a much increased range and flatter trajectory, with consequently greater initial velocity or force, and fitted with magazines which make them capable of firing a larger number of cartridges in a given time.

Most of the great powers have now adopted rifles of the above description, differing little in general type, as far as concerns our present purpose; of them our own, the Lee-Metford, may be taken as an example.

Its range of aimed fire is up to 2,900 yards; it carries a small bullet, calibre .303, made of lead enclosed in a capsule of nickel, whose initial velocity is 2,000 ft. per second; and it is fitted with a magazine containing ten cartridges, which can, if necessary, be fired in the space of 30 seconds.

How will the use of such weapons as these on both sides influence the number of killed and wounded and, in the latter case, the severity of wounds?

Speaking generally, the destructive action of weapons appears to increase in direct ratio to their range, their initial velocity or force, their power of penetration, and the rapidity with which they can be discharged. Thus Professor Longmore in his classical work on 'gunshot injuries', speaking of the change from smooth-bores to rifles, says, "The sustained energy of projectiles discharged from rifles gave to combatants a vastly extended range, over which a severe fire could be maintained, and to military surgeons a proportionally increased number of severe wounds to treat, and again, "Speaking roughly

the change from smooth-bores to rifled weapons gave ten times the range with greatly increased precision of aim ; while the change from muzzle-loading to breech-loading weapons, without any diminution of range or accuracy, has increased the capability for rapidity of fire tenfold."

It is a curious fact, however, that statistics of killed and wounded in various great battles and wars do not support the view that increase of wounded is in proportion to improvement in weapons. Thus, while the match-locks and flint-locks used at Blenheim caused a loss among our troops of 23 p. c., and the flint-locks at Waterloo the same, the percentage of killed and wounded during the Crimean campaign, where the Minié and later the Enfield rifle were used, was only 15 p. c ; while at Königgrätz the combined forces of Austrians and Saxons only lost 14 p. c ; and the Prussians, the victors, 7 p. c ; lastly, during the Franco-German war of 1870 Engel gives the German statistics of loss for the whole war at 13 p. c.

The apparent contradiction may, I think, be accounted for by considering the enormous increase in modern armies, which is so great as not to permit the whole or even a large fraction of the force to come under fire ; for all these statistics are as to the proportion of killed and wounded to the total force in the field, not to that part of the force actually engaged ; and in order properly to estimate the deadly effects of improvements in weapons of war we want particulars, such as may better be gleaned from the pages of a historian, of actual engagements and the resulting casualties. In the Journal of the Royal United Service Institution for 1862 is a paper in which the writer, from a review of such statistics as I have just given, is actually led to question the superiority of the rifle over the smooth-bore as a destructive weapon ! This is an instance of the misuse of statistics which is so common in our day, and which throws discredit on most valuable sources of information. In order to draw accurate deductions from statistics, it is obvious that the general conditions of the various factors must be the same.

However, I think that all here will be prepared to admit that the general effect—increase of wounded. of general effect of all improvements in fire-arms from the old match-lock, the flint-lock, the percussion smooth-bore, the Enfield, Snider, to the Martini-Henry, has been to increase the number of wounded in war proportionally to those actually engaged, and for purposes of time and argument, they must take my word for it (not, I think, with hesitation), that the wounds inflicted have been *pari passu* more severe and fatal.

Particulars of new rifle. And now to proceed to the particulars in which the new rifle differs from the old.

Its range being considerably greater, it is evident, without touching on questions of tactics, that troops will be longer under fire, both unaimed and aimed, before coming into contact ; and the loose formations, that will

be probably adopted to avoid loss, will tend to greatly increase the area of fighting, and so to spread the wounded over a larger extent of country.

The initial velocity or force of the bullet is increased which, besides rendering the range longer, makes the penetrative power greater—so great that doubtless one bullet will often pass through many men. Longmore says, “The rule is that, if the velocity of a bullet be increased, its destructive power will be augmented proportionably with the square of the increase in velocity”; that is, for instance, if bullet A. at a given distance, say 1,000 yards, travel at twice the rate of speed of bullet B., then from that cause alone, taking no account of difference in shape or weight, its power of inflicting injury will be quadruple that of B. We shall find later I think, that this statement requires some modification.

The application to the rifle of a magazine containing ten rounds which can, if necessary, be fired in less than the time it took to discharge three rounds, must make its destructive power, other things being equal, almost four times as great as the Martini-Henry.

I would now direct your attention to what seems to me the most important change in the new rifle. The bullet. Much criticised. I mean the bullet. Much criticism has been directed against it both by military men and sportsmen, whose arguments have mainly been that its lessened size and weight mean lessened stopping power. Their arguments have been met by quoting past experience, in which it is shewn that all improvements in war-rifles have been accompanied by a progressive diminution in size and weight of the bullets, and yet, so far, there have been no complaints of insufficient destructiveness.

A consideration of the decrease in size from the Snider to the Lee-Metford bullet, and a comparison between the cartridges used in the Snider, Martini-Henry, and Lee-Metford, will suggest that there should be grave reasons for introducing so radical a change. The essence of war is to put out of action as many of your

opponents as possible, and in the case of the bullet the question is to attain such a mean between portability and destructive power as will secure the largest number of casualties with the smallest weight to be carried by the soldier. Formerly the destructive power was mainly looked to,

latterly increase in number of rounds has been thought of more importance; and it is recognized that it is better to encumber your enemy with a host of wounded than to kill him; and since a comparatively slight wound is sufficient to incapacitate a soldier for his work, to damage him more than is necessary for this is clumsy and cruel.

The result has been the small bullet of modern armies, the Mauser .311, the Mänlicher .315, the Lee-Metford .303; and though to many we seem to have arrived at a point past which it would be hazardous to go, Italy

Bullets of continental armies.

and Roumania have lately adopted a still smaller calibre, .255, while Austria and Germany are contemplating a change in the same direction, and Dr. Kepler of the Swiss army is in favour of adopting a bullet of .196 calibre as sufficient to place men *hors-de-combat*.

But there is another difference in the new bullet which seems not to have at first attracted the attention it deserves, and which, taken with its decreased size and increased force, will, I think, render it more interesting to military surgeons than any other—I mean the hard material of which it is made.

It is really the main point in which the new rifle differs from the old, for it is a difference in principle not only in degree; whereas initial velocity, longer range, increase of rounds, quicker discharge, diminution in size and weight of bullet, are all qualities in which the Lee-Netford rifle differs from the Martini-Henry as the Martini-Henry differed from the Snider. We have in this great increase of hardness a new departure, of the effect of which we have practically no experience.

A priori, what should we expect to be the differences in wounds made by a bullet, small, light, and hard, impelled by a greatly increased force, from those made by a larger, heavier, and softer one with a less initial velocity? I think we should expect a smaller and more clean cut wound in the softer tissues (flesh); and in the hard tissues (bones) less crushing and more splintering.

In the successive bullets which have been used by us in warfare, we have a gradual diminution in size and weight from the old round smooth-bore to the long wedge-like Martini-Henry. All these bullets have been progressively more destructive, but it is by no means easy to find out how much of that destructiveness was due to the bullet itself, and how much to the power which impelled it. The change from round to conical balls of less weight, though accompanied by an increase of velocity due to rifling, which tends to obscure the results, yet appears to have itself changed the character of wounds on the side of severity by reason of—

1st.—The wedgelike action of conical balls, which makes their penetrative power greater, enabling them to pass through soft tissues, and to splinter bones instead of being turned by or buried in them.

2nd.—The substitution of several diameters for one, so that, while a round bullet could only make a hole the size of itself, the conical bullet makes a hole possibly as small as its smallest diameter, but often, owing to 'wobbling' or 'deflection,' one corresponding in diameter to its own long axis. The shape of the new bullet is still more conical than that of the Martini-Henry, and this in itself will give more penetrative power.

The gradual decrease in size, which accompanied this change of shape, does not so far appear to have lessened the destructive action, nor does

As to size and weight.

the diminution in weight ; but it is at least arguable whether by further reducing the size by $\cdot 147$ of an inch and the weight by 163 grs., we have not reached the limit of effectiveness.

When, however, we come to consider the difference in consistence between the Martini-Henry and the new Lee-Netford bullet, we are face to

As to consistence.

face with a problem in which we have practically no past experience to guide us. Some hardening indeed was effected in the Martini bullets with a view to increasing their penetrative power, but this hardening (which consists in an alloy of tin and lead) is not sufficient to prevent the bullet receiving the impress of a thumb-nail, and I am not aware of any important changes in gunshot injuries attributed to it. It breaks or bends in contact with hard bones, and its wounding power is thereby much increased by reason of its own change in shape, and the destructiveness of the splintered bones to which it partly communicates its force. Will the new bullet follow the lines of precedent, or will its great increase in hardness introduce a new feature into the wounds of the coming war? Longmore remarked in 1877, "Should steel or any

Predictions.

similarly hard and coherent metal ever be found capable of being economically employed in fire-arms, many of the ordinary features of gunshot wounds as they at present exist, will be materially changed ;" and it will now be my business to bring before you a few recent experiences which tend to confirm this prediction.

In the Departmental Blue Book for the medical services for 1890,

Cases of wounding by the new bullet.

Surgeon-Captain Parry Marsh, Medical Staff, records two cases of accidental injury by bullets from the new rifle ; and he subsequently read a paper in the Royal United Service Institution calling attention to the probable difference in character of wounds caused by the new bullets. The cases he gives were (shorn of technical details) as follows :—

Case I. Was that of a labouring man who, while at work in rear of the rifle ranges at Aldershot, was shot through the fleshy part of the right thigh by a bullet from the new rifle. He was one mile and 800 yards

At long distance.

from the firing point, and the bullet had ricocheted twice, once from stone and once from water. After passing through the man's thigh it still had energy enough to bury itself deeply in the ground, and was found undamaged and unaltered in shape in any way. The man did not fall when struck, nor did he know he was seriously hurt ; the wound was clean cut with very little bruising, much like what would be produced by a long narrow-bladed knife, and it healed, as such wounds do heal when treated by modern measures, rapidly and well. The man was discharged from hospital four and twenty days after.

Unfortunately for the man but fortunately for science, he died sometime after of bronchitis, and careful examination revealed complete healing of the bullet track, so that the only indication of his injury were the two scars at entrance and exit.

Case II. Was a Woolwich operative who was struck while at work with one of the new bullets fired at about 100 yards from him. He too was struck in the thigh and the bullet passed through the flesh without touching the bone. The wounds were in this case more ragged, but their main character was the same, and he was discharged well 32 days after admission. He too was not knocked down by the blow, nor were there any serious symptoms such as shock.

From these two cases Parry Marsh argues that, in future wars when the new small-bore rifles are used,

Deductions. wounds are likely to be less severe, accompanied by less shock, uncomplicated with lodgment of balls, and prone to heal rapidly, permitting men to return to the ranks during the course of hostilities. As he justly remarks, injuries such as these inflicted with the Martini-Henry bullet would probably have lost the men their legs if not their lives, but it must be remembered that in the Franco-German war, where the principles of modern surgery were first applied, and in our own Egyptian campaigns, many wounds made by the Martini-Henry bullet healed with astonishing rapidity, and all the credit for the quick recovery of his patients must not be given to the bullet which caused the injuries. Further I would suggest that the very absence of bruising and laceration carries with it a danger of its own. The comparative rarity of severe bleeding on the field of battle is well known to be due to the crushing to which the tissues and with them the blood-vessels are subjected, and I see no reason to doubt that a bullet which can punch a clean hole through a man's thigh, would do the same to any large vessel in its path: the hard, sharp, elongated bullet at its high rate of speed will cut like a knife, and this means bleeding and death. Colonel Boonen Rivera, who acted as Brigade Commander in the Chilian war, specially reports on the large number of dead compared with the wounded. He estimates the number as four dead to one wounded; this is a very great contrast to the usual estimate of one dead to five wounded, and, if true, requires some such explanation as I have ventured to suggest, viz., increased fatality from wounds of blood-vessels. It is, however, dangerous to argue from the particular to the general when your particulars are few.

Experiments. carried out with the new rifle some three years ago by Professor Smith, A. V. D., and Sir Thomas Longmore, Medical Staff, appeared to show that, when bones were

hit by the new bullet, the effects were even more disastrous than with the Martini bullet, and more lately some French experiments with the Lebel bullet have been published, which tend to show almost explosive action at short distances. Professor Smith states that in his experiments the wounds of bones and joints "were simply appalling, the shafts of long bones were reduced to fragments and joints converted into cavities containing nothing but bone dust;" and Surgeon-Colonel Godwin, Professor of military surgery at Netley, considers that the French and English experiments taken together justify him in his opinion, "that the characters

of the wounds thus produced by these small enveloped bullets are likely to be of a nature that will try the surgeon to the utmost, and will not be conducive to the soldiers' speedy return to a military life." All these experiments were, however, made with a softer bullet than is now in use, and on dead horses, not on living men. It is said that Roumania is experimenting with a soft bullet designed to 'set up' on impact, that is to spread at its base and so cause a severer wound, a fact which, if true, is significant.

Without going into further details, as time is short, I may say that, so far, all the wounds of bones that have occurred in men tend to show

Recent cases.

that the amount of damage is proportionate to the resistance offered; soft bones, such as those of the wrist and ankle, and flat bones, as the skull and shoulder blade, are perforated by clean cut 'key-hole' wounds; while hard bones, such as the thigh, arm, and leg, are broken and splintered.

Surgeon-Captain Parry Marsh has kindly informed me of two recent cases at Aldershot, both fatal. In one case the bullet passed through two doors, and then through both thighs of one man and one thigh of another; the bones in the first man hit were splintered and the vessels divided. In the second case a man shot himself through the heart, the wounds of entrance and exit were quite small and clean cut, a great contrast to several similar cases that I have seen caused by the Martini-Henry bullet.

In the late Chilian war about half of the victorious army was armed with Männlicher rifles, the Balmacedists carrying weapons of larger

The Chilian war.

bore. This accounts for the comparatively small number of wounds caused by the small bullets, which are almost identical with our own. According to Dr. Stitt of the United States army, the flesh wounds and those of flat and soft bones were clean cut and healed readily, many wounds through the hands and face, for instance, being sent out of hospital in a fortnight without deformity, and with perfect movement. Wounds of the lung also were noted to be much less fatal than usual. "With long bones", he says, "unless the projectile simply passes through without fracturing, the immediate result differs but little from that produced by a lead bullet, and, strange to say, the length of bone comminuted (that is broken into fragments) is greater." Nothing shows more graphically the comparatively humane character of the new bullets, than the fact that all those wounded by them had left hospital, while 300 of those wounded by large bore rifles remained. These results Dr. Stitt considers due to the fact that the bullet is so hard that it never loses shape or splits up, even on striking bone. Several other surgeons present at the Chilian war confirm these observations and opinions of Dr. Stitt. On the other hand, I may perhaps quote the remarks

German opinion.

a great German authority, Professor von Bardeleben, a surgeon of extensive experience in military surgery. "The new projectile," he says, "is by no means so humane as it is sometimes called, because, within similar

periods of time and under equal conditions, it kills and wounds more men than the old bullet; but the wounds which it causes, if not immediately fatal, open to the surgeon a more promising field for exercising his skill."

On the whole I think we may say that in the next war we must be

General conclusions. prepared for a large increase of wounds amenable to treatment, a comparatively small increase of severe wounds, and a high proportion of dead. The labours of the surgeon will be increased, but the proportion of recoveries will be larger.

Changes in the medical services. Next as to the modifications required in our medical services to meet these changes.

The great difficulty of the medical services in late wars has been

Concentration of wounded. the concentration of enormous numbers of wounded in a short space of time within a limited area, and the impossibility of dealing satisfactorily with such a mass of suffering. I may again quote Professor Longmore's words:—

"All must admit that the changes in tactics resulting from the alterations made of late years in military weapons, especially from the introduction of breech-loading rifles (the result of which, I may remark, was mainly increased number of rounds discharged in a given time), have greatly increased the difficulties in the way of giving

Difficulties therefrom. adequate early attention to the wounded on certain parts of the field. The great disproportion in the losses among troops at different parts of the field of action in modern warfare, and especially the excessive numbers that fall wounded on certain portions of the ground within brief periods of time, create special difficulties in surgical administration. The great lateral extent too now generally taken by the troops in front, and the whole formation of the fighting line, are other impediments to early surgical assistance."

How much will these difficulties be increased by the widened area

Increased by modern weapons. necessitated by a rifle carrying twice as far, and by a multiplication of discharges at short ranges, such that it can only be compared with a hailstorm of missiles? Truly, as far as weapons are concerned, the results of the next European war are horrible to contemplate. But lately Professor Bilroth of Vienna in a much discussed lecture on the adoption of a new rifle for the Austrian army said:—

"One of the cruelties of modern civilization is that, while all coun-

Continental opinions. tries are in competition to produce weapons of the most absolute precision and giving the deadliest result, little or nothing is done to make the medical services keep pace with these improvements. Every new gun carries further and wounds at a greater distance than its predecessor, and this means that the shelters for wounded have to be set up at a greater distance from the line of battle. Thus all ambulance duty to be effectual should be proportionately increased."

And in a speech on the same subject at the Austrian delegations,* he reiterates these opinions, and says that he is convinced, and he is a man of large experience, that, in every form of fighting, modern weapons will cause an increase both in the number and severity of wounds.

As at present laid down in regulations, an army corps, numbering 37,431 of all ranks, has with it 118 medical officers (including 13 quartermasters.) This number includes the administrative medical officers of the force, the medical officers doing duty with regiments, and those with the 10 field hospitals and the six bearer companies. The establishment of warrant officers, non-commissioned officers, and men of the medical staff corps for the same is 798. Omitting the details at the base (2,447), which leaves an army corps almost 35,000 strong, this gives medical officers in proportion of 1 to 333, and medical staff corps as 1 to 44, while the number of hospital beds would be about 1 in 35. These numbers are based on the principle of the evacuation of wounded rapidly from front to rear, the field hospitals being regarded for the most part as glorified 'dressing stations,' until with the advance of the army they are left behind as hospitals on the lines of communication.

Based on rapid evacuation. European armies, the total loss will never exceed 10 per cent. on either side, whilst frequently it will be less than half that amount; and if you provide for the care and transport of wounded men at the rate of 6 per cent., irrespective of whether they may or may not be exposed to fire, you will have done all that is necessary." Judging from past experience only this would not seem optimistic, but taking into account the probable increase due to modern arms, I should call it a dangerous statement. The wounded on the German side during the Franco-German war varied in different battles from 6 per cent. to less than 1 per cent., but some account must be taken of the sick incidental to a large force, in ordinary circumstances amounting to 5 per cent., and certain to be largely increased by the accidents and privations of a campaign. Colonel Furse, in his work on military transport, acknowledges that that for the medical services is most difficult to estimate, on account of the varying circumstances, the best authorities giving estimates differing as widely as 15 and 5 per cent., but he shrewdly observes that the only wise course is to have a considerable reserve always ready for use.

General Lord Wolseley considers that, "in a battle between two European armies, the total loss will never exceed 10 per cent. on either side, whilst frequently it will be less than half that amount; and if you provide for the care and transport of wounded men at the rate of 6 per cent., irrespective of whether they may or may not be exposed to fire, you will have done all that is necessary." Judging from past experience only this would not seem optimistic, but taking into account the probable increase due to modern arms, I should call it a dangerous statement. The wounded on the German side during the Franco-German war varied in different battles from 6 per cent. to less than 1 per cent., but some account must be taken of the sick incidental to a large force, in ordinary circumstances amounting to 5 per cent., and certain to be largely increased by the accidents and privations of a campaign. Colonel Furse, in his work on military transport, acknowledges that that for the medical services is most difficult to estimate, on account of the varying circumstances, the best authorities giving estimates differing as widely as 15 and 5 per cent., but he shrewdly observes that the only wise course is to have a considerable reserve always ready for use.

Surgeon-Major Riordan, an officer of great experience, considers that sick carriage should be provided for 10 per cent. of the entire force. The ratio of wounded to troops engaged he puts at 1: 9, and that of killed to wounded (and here most authorities are agreed) as 1: 5. All these estimates have been based, as also our own regulations, on the experience of the 1870 war.

* See Journal of United Service Institution of India, No. 93, May 1892.

Let us see what steps the greatest military continental nation has taken. Since 1871, and specially since the new regulations of 1878, the German ambulance system has been steadily improved. Every increase in the troops has been accompanied by an increase in the medical services. Each army corps has three "sanitäts detachments," answering to our "bearer companies" but double their strength. The German military ambulance department can count on 150,000 beds, of which 40,000 can be made available in 24 hours. The official staff is supplemented by the volunteer staff of Red Cross and other Societies, and Dr. von Coler, the head of the military medical department, considers that the whole organization has kept pace with modern improvements.

Major Galde, in a speech in the German Reichstag on February 18th, 1892, stated there was no doubt that in the next war we should have a much larger number of wounded, and then, turning to the question of ambulance organization, he said, "In 1870 our wounded were 116,821 men, *i.e.*, 14·8 per cent. of the total number in the field; of these 17,000, in round numbers, died at once, so that there remained a percentage of 12·6 for surgical treatment. For the new war we calculate on a loss of 20 per cent., that means that an army corps would have 7,000 casualties; of these there would be 1,200 killed and 5,800 wounded, and of the latter about one-third seriously injured and two-thirds with slight injuries. For this number we should dispose of 150 surgeons and 300 ambulance assistants. Thus each surgeon would have charge of 12 or 13 seriously wounded men and 26 men with slighter wounds." In the discussion which ensued, Professor Virchow remarked that 20 per cent. would represent the average loss, but not the loss in any single battle. Under the altered circumstances the loss in many of the engagements would be much above the average of the campaign.

Thus we see that the Germans, recognizing the changed circumstances, have logically increased their ambulance to cope with the expected increase in wounded.

The number of wounded struck down in a very short time in modern battles, before these later innovations of magazine rifles &c., has been so enormous, and the difficulty of

Is evacuation of wounded always best?

removing them sufficiently quickly to the rear so great, that it has occurred to more than one military surgeon whether the rule of speedy evacuation to the rear is, in all cases, the best. Doubtless, from the point of view of the General Commanding, it is greatly to his interest to get rid quickly of all his wounded, leaving his front clear, and in the event of retreat not being hampered with all the enormous impedimenta of sick carriage; it is also said to have a bad effect on the morale of an army to have its sick and wounded too much in evidence;

Changed conditions.

but since the protection offered by the Geneva Cross to the wounded in 'ambulance' hospitals, and since the development more recently of volunteer help in the field, by means of Red Cross Societies &c., the question has somewhat changed, and *fin-de-siècle* humanitarianism many possibly

ask if the interests of the wounded need be so completely subordinate to the military necessities.

The great strides also made of late years in the science of surgery, since the adoption of the principles associated with the great name of Lister, And modern surgical results. have too made possible the successful treatment of wounds that before were thought hopeless and left to their fate ; so that now it is possible to predict recovery from many most severe wounds, if only they be placed in favourable conditions. For instance, quite recently it has been proved that what were a short time ago considered necessarily fatal wounds of the head and body may, thanks to treatment logically developed from Listerism, be treated with fair prospects of success, provided again that they be placed in favourable circumstances ; circumstances the direct opposite to those pertaining to the present method of speedy evacuation.

I do not wish to bore my audience with technical details, but when I mention that speedy application of clean dressing, immobilization of the part wounded, perfect quiet, and Suggest treatment *in situ*. above all clean air and surroundings, are absolutely necessary, it will be evident that these are least likely to be found in the necessarily rough and ready aid in the field, the long transport to efficient surgical assistance, and the constant movement necessitated by the present method of evacuation. It has therefore been suggested that these more serious wounds should be treated in temporary impromptu shelters erected on the field of battle itself, until able to bear removal, that if the army advance they should have medical assistance left with them, that should it retreat they should be allowed to fall into the enemy's hands under the terms of the Geneva Convention.

Speaking as a surgeon, I cannot help seeing that the principle is correct : speaking as a soldier it appears risky to throw aside, even in part, principles that up to now have been acquiesced in by all authorities medical and military.

But change of circumstances requires change of methods, sometimes even of principles, and in face of improved surgical results, likely to be still more marked in the future from the simpler character of wounds caused by the new bullets, and of changed conditions resulting from the Geneva Convention and the great development of Red Cross Societies, and still more, from the humanitarian tendencies of the age, I do not envy the political position of even a successful general whose triumphs are won at an unnecessarily cruel cost to his wounded.

Taking the German estimate of loss as 20 per cent. on the number in the field, (regarded as an underestimate by so great an authority as Estimate for military services. Virchow), let us briefly consider the increase of medical services needed for one army corps in our own army. I shall use whole numbers for the sake of convenience.

The total of an army corps at the front (without a cavalry division) is roughly 35,000 men, of these Sick. Wounded. (at the low estimate of 5 per cent.)

1,750 will be constantly sick, the total wounded will be 5,800; these 1,900 will be serious and 3,900 slighter wounds. For the 7

Medical officers. five medical officers will be in giving roughly, 15 serious wounds, 12 sick, and 26 of slighter wounds; this is allowing a higher proportion than the Germans use; besides these, there will be five administrative officers, and there will be a reserve of 10 per cent. for casualties, the total amount of medical officers. This is slightly larger than the German estimate on account of differences in organization, the whole control and care of the medical services being with us carried out by the medical officers. The rank and file would of course have to be increased in proportion.

Passing next to hospital accommodation. On the same basis, hospitals would be required for about the sick and one third of the wounded, i.e., 2,700, and for this number, supposing the army were to be sent to a country where shelter cannot be obtained, perhaps 27 hospitals would be wanted, but this, in a war in a civilized country, is unlikely. The circumstances vary so much that it is impossible to give a fair estimate; perhaps 15 field hospitals, and a few to 100, supplemented by stationary hospitals, and evacuation of a very serious cases, might be sufficient.

The bearer companies also must be increased or strengthened. The medical officers being a factor in the latter, this assumption is not correct. German's estimate of 200 men. But here we must remember that in increasing the numbers, we are also increasing the possible wounded, for the province is to advance under fire to the front, and as a German's second duty is to take the wounded to the rear, we are fully prepared to receive such numbers as possible in war, but we must not sacrifice our future efficiency in order to effect the momentary saving of one. He was also saying, even of a very small war, in the event of a small war, the wounded would be 1,000, and I think says that the German's estimate of 1,000 is too low, but it is not safe to say that the number need not be increased, but the number is very close to 1,000.

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To meet these views some more mobile arrangement than field hospitals seems advisable, and what is called the tortoise wagon, a combination of ambulance wagon and small hospital is well adapted. Perhaps 5 out of the 15 field hospitals might be composed of these, and after an action they could be placed in any convenient part of the field, and handed over temporarily to the volunteers. Each of these wagons is complete in itself for the accommodation of 20 men.

But in order to effect any improvement, organization and practical experience are necessary. That volunteer aid societies should be organized in time of peace in order to be of use in time of war, would seem a truism; and so would the dictum that bearer companies and field hospitals should be constantly exercised in their duties, were it not that the very opposite of this is the fact, owing I suppose to the expense involved.

And now I will ask you to accept the following conclusions as deductions from the facts and premises I have had the honour to lay before you :—

1. That the use of smokeless powder and rifles of longer range will extend the fighting line and increase the dangerous area; and also, by increasing accuracy of aim, multiply the wounded while pushing back the means of aiding them.
 2. That the use of the magazine will tend to multiply the number of severely wounded over a restricted area in a short space of time.
 3. That the new bullet, small, hard, conical, and expelled with increased force, while causing more killed and wounded, will tend to render the wounds themselves, when not of vital parts and when not implicating the hard bones, more amenable to treatment.
 4. That the great increase of wounded will necessitate a corresponding increase in the medical services.
 5. That volunteer help by neutrals may be fitly employed, under the authority of our own officers, to render aid on the field of battle, as well as in rear of the field hospitals; and that with this view they should be organized during times of peace.
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At Secunderabad, on August 19th 1892.

THE TRAINING OF CAVALRY FOR RECONNAISSANCE,

By Captain H. L. PILKINGTON, 21st Hussars.

Cavalry in war has, speaking broadly, two great functions to fulfil. One is to fight; the other, to reconnoitre. In every duty of the arm the fulfilment of one or both of these functions is aimed at. It is true that in practice the two classes of duties so intermingle that the value of an arbitrary distinction may at first sight be doubted. Outposts, for instance, have equal shares of fighting and reconnoitring: the mass of squadrons advancing to a grand attack, must reconnoitre the enemy and the ground up to the very moment of the shock: the most advanced patrol or the single scout, whose duties form the nearest possible approach to pure reconnaissance, may at any moment have to fight in self-defence or in order to achieve the object in view. But the importance of the distinction I have drawn lies in the difference between the training of the man-in-the-ranks as a fraction of the fighting body, and his education as an intelligent reconnoitrer. He is taught to fight in the ranks by drill; and the aim of drill is to get complicated and ever-changing tactical combinations carried out mechanically, with the least possible exercise of thought or judgment. Its essence is unreasoning obedience to the command which admits of only one interpretation; and its tendency is to dwarf power of observation, quickness of thought, the habit of self-reliance—in short, to eliminate from the working of the soldier's mind every quality which, as a reconnoitrer, he must be taught to cultivate. The scout and his immediate commander must be governed by circumstances not by command; and observation, self-reliance, quickness of thought, and soundness of judgment, are the very qualities on which their efficiency as reconnoitrers depends.

Last year Captain Lawford, of the 1st Madras Lancers, read here a most valuable—I think I may say a famous—paper on “Cavalry Tactics,” that is on the fighting function of the arm.* I should have been glad to attempt a sequel to that paper. But, apart from my own inability, this is hardly possible: for our starting points are very dissimilar. He was able to take for granted the elements of his subject, those elements which are contained in the manuals of drill. He began by having not only instructed soldiers to talk about, but squadrons, regiments, brigades, and divisions, drilled on an established system; whereas I am obliged to confess that I do not know where the cavalry recruit is supposed to begin his education as a reconnoitrer, or on what system that education is supposed to be carried out. I must therefore begin with elementary matters, and, though I will spare you any but

* See Journal of the U. S. I. of India No. 87, 1891.

the briefest sketch of them, they will form the chief subject of my paper; and it will be impossible for me to do more than touch upon such interesting matters as the working of the cavalry screen, or the handling of the independent brigade or division in contact with, or during the search for, the enemy.

Let me frankly say that I believe reconnoitring to be, in modern war, a more important duty of cavalry than fighting, and that I am certain that efficiency in reconnoitring demands greater expenditure of time and labour than similar efficiency in fighting. Yet I hope that in saying this I may not be held to underrate what my arm can accomplish on the field of battle. So far from doing so, I firmly believe that the rapidity with which cavalry can move has acquired a quite new tactical importance in these days of ever-extending zones of fire—an importance which has never yet been duly appreciated by any military writer I am acquainted with. And I am quite prepared to see a mass of horsemen sweep the field of Armageddon—electricity, high explosives, smokeless powder, magazine rifles, and mounted infantry notwithstanding—provided only that those horsemen have prepared the victory by successful performance of the strategic duties which appear in modern war to be the necessary prelude to successful battle. Nor do I wish it to be thought that I undervalue precise and rigid drill. On the contrary I believe nothing to be more dangerous than the tendency to despise accurate knowledge of the details of drill, and to consider such knowledge as necessary only to the drill-sergeant, a tendency which is the result of experience gained only in petty and irregular warfare such as our troops are most frequently engaged in. I plead, not for less drill, but for more instruction in equally important duties. And I will endeavour to show that some of this might be accomplished by an improved economy of time.

I maintain, however, that it is the custom of our service to devote too little time to training in reconnaissance, and that our standard of efficient reconnoitring is, to say the least of it, not high enough. I believe, moreover, that we lose the value of much of the education and intelligence possessed in these days by the average recruit, by omitting to train his mind, when he first joins, in any higher military sense than that in which the drill-instructor may be said to cultivate it. And I am certain that the absence of any regular, progressive, and sufficiently detailed system of instruction in his duty as a reconnoitrer, is responsible for much of the diffidence regarding this duty too often displayed by the old soldier who has been taught, in the succeeding years of his service, by different instructors, each one with theories and a system of his own. Let me add that we—of the British service—have perhaps hardly yet realized how hard and how unrelenting is the labour necessary to keep a short-service cavalry up to the level demanded by the conditions of to-day.

I much regret that the third volume of the new cavalry drill has not yet reached India. I should like to have made sure of being, in all that I would apply to the training of troops, within the spirit, and indeed the letter, of what is there laid down. It is perhaps one of our

points that the letter of the law is too little respected in our peace training; and, if so, we, the regimental officers who have to carry the humbler details of that training out, are largely responsible for any flaws that may be found in the code we work under. For the surest way to have a bad regulation altered is to obey it to the letter, and it should be our object in time of peace to let the flaws of our system be recognized, rather than to conceal them at the risk of a breakdown in time of war.

I will, however, take advantage of the absence for the moment of authoritative instructions regarding the subject of my paper, to put forward ideas which may not prove to be in accordance with those instructions when they appear. I do so, however, for purposes of discussion only, believing, as I do, that it is not only necessary from a disciplinary point of view, but of paramount importance to efficiency, that in the actual training of our men we should be at all times within the four corners of the "red book." It will not be worth while to distinguish between what is in accordance with obsolete regulations and what I should be glad to see embodied in the new ones. I will therefore treat the subject, from this point, entirely without reference to any rules officially promulgated. It will nevertheless be seen, from what I have to say, that I believe we should advance in the direction of fuller and more precise regulations rather than towards over-reliance on individual inspiration, and that I regard with suspicion any tendency to trust the future of our arms to uninstructed common sense.

I know it is now generally admitted, as a result of modern experience, that independence of thought and action on the part of subordinates and individuals, must, for reasons which I need not enumerate, in future warfare largely take the place of centralized authority; though centralized authority, under conditions that no longer exist, was once rightly regarded as the first principle of military command. But independence of action must not be confounded with independence of the object in view, or with independence of those sound principles which apply in all circumstances. And, in cultivating the habit of acting in accordance with circumstances and without definite orders, we must be careful not to disregard the necessity for such training as will secure that individuals will act not only independently, but also in the right way. Our object should be to inculcate sound principles and to deduce from them general rules by which independent action may be governed. The true meaning, I take it, of the independence which is to replace centralized authority, is action in accordance with such principles and rules in contradistinction to dependence on definite orders. And, if this is so, the training necessary under old conditions, so far from being dispensed with, must be replaced by something much more difficult and much more thorough to suit the new order of things.

I have now tried to indicate my general point of view, and, without further preface, will proceed to the details of my subject.

The training of cavalry for reconnaissance may be conveniently dealt with under the following headings: (1) the training of the individual soldier; (2) the training of the squadron, which may now be

regarded as the chief unit of instruction ; and (3) the training and exercise of larger bodies.

Training of the Individual Soldier.

A reason has been already given why the training of the individual cavalry-man in reconnaissance might well be begun as soon as he joins, and carried out simultaneously with the other branches of his training as a recruit. But, if this is to be done, some regular and progressive system must be devised, so that instruction may be uniform, and that every soldier may be able to work as well under any leader as under the one he was instructed by. To advise such a system is a serious and difficult task ; and yet it is what every squadron leader in our service must, under existing conditions, do for himself, if he is to have a system of instruction at all, and if he is given no direction to work under other than those contained in the manuals published by authority. All I can do, therefore, is to lay before you the principles by which, as a squadron leader, I endeavour to be guided in the training of my own squadron, and to explain how I have attempted to reduce that training to a system which, as far as it is applicable under present circumstances, I try to apply to my work. My principles are probably often unsound and my system faulty. I put them forward, however, in no spirit of over-confidence, but rather submit them to criticism in the hope of eliciting from others much more than I can possibly expect to teach.

No doubt among the duties of the reconnoitrer there are many which can only be practically learned with a larger body than a squad of recruits ; but, on the other hand, there is much that can be taught to the squad and the individual ; and those who have had most experience in the training of young soldiers will probably be the first to admit that the simpler matters which can be dealt with before the squad stage is quitted, are those in which the young soldier and his instructor find their greatest stumbling-blocks. We must remember that, well educated though the average recruit may be, he is frequently town-bred, and has seldom had any training in that field-craft which our pursuits have made a second nature to most of us. To understand exactly where his training should begin, we must try to comprehend the difference between his experiences in this respect and our own. Let any one who wishes to do this, get together a few young soldiers just out of the riding master's hands, take them into the country, and direct them to carry out such simple orders as these : tell one to ride a quarter of mile towards the north ; another to look over a wall and report what he sees at the other side ; ask another to ride to the top of a neighbouring hill and place himself where he can see the ground beyond without exposing himself unnecessarily to view ; and a fourth to deliver the simplest verbal message to a third person. I venture to predict that the results will generally be astounding, though they need not, on reflection, lower our estimate of the British soldier's capacity ; but they will give us useful information as to where the reconnoitrer's education should begin, and will prevent our taking it for granted that all young soldiers know many things which they have had no chance of learning,

things we have had to learn ourselves, though probably by a process we were unconscious of.

Practical field-craft must, no doubt, be acquired in the field, most of it after the recruit has become more or less proficient as a horseman. Is it then good economy of time to begin his training as a reconnoitrer before he has learned to ride? I know the prejudice which exists against what is called theoretical—that is indoor—instruction. Such instruction alone is no doubt almost useless: too much of it is unquestionably bad economy of time; and, in giving it, it should be remembered that the power of concentrating the mind on such instruction has to be acquired, and is less developed in proportion as the mind has been less scholastically educated. The illiterate recruit of old days could profit little by it, but every year the men who enlist are becoming more and more capable of mastering the theory of their profession and applying it for themselves. It is therefore the worst possible economy to reject indoor instruction as altogether useless, though, without doubt, the indoor lessons should be short, not over-condensed, and not too frequent. Half an hour or less well spent daily, or even on alternate days, during the time before the recruit can take his horse into the open, would give him some idea of the nature of reconnaissance and outpost duty, and he would experience later in his training the undeniable pleasure of applying in practice what has been learned theoretically. Such a method would also do much to counteract the cramping tendency of the lessons in the riding school and on the barrack square.

This early instruction might be made, by avoiding detail, to cover the whole subject of reconnaissance, and might be brightened by selected instances from military history. To begin with, the reconnaissance of country should be distinguished from the reconnaissance of an enemy; and, in illustration, the objects of the ground-scout and the combat-patrol might be explained, these being the simplest forms of either class of reconnaissance. The duties of patrols entrusted with missions of various kinds, the work of the point, of advanced and rear parties and flanking patrols, even of connecting files and orderlies, may be taught. The precautions to be taken by large or small bodies halted or marching, and the methods of examining different localities, will supply the subject of many lessons. The value of extreme accuracy in reporting or repeating messages should be inculcated; and so, by degrees, the more advanced portions of the subject may be approached, and the duties of advanced and rear guards, of the contact squadron, and finally of the largest masses used to screen the most extended operations of war, touched upon in general terms. Such instruction will not be thrown away, and will, I think, facilitate the instructor's work when he can take his pupils into the field.

Once there, the details of each man's duty in every situation must be carefully and thoroughly taught. From what has been already said the manner of beginning this instruction may be guessed. The first step towards finding the way over a strange country is a knowledge of the points of the compass, and of the practical means of fixing them. Let us suppose a squad of recruits to be taking their first lesson in the

field near Secunderabad. The course of the sun, and its position at different hours of the day, and at different seasons, would naturally be first explained. It might next be pointed out that the direction of the prevailing wind, the south-west monsoon, is plainly marked on almost every exposed tree, and that the profile of any tree most affected by it can be easily determined by riding round and examining the tree from different points of view; that, if the direction of any severe storm be observed when it takes place, the lie of the crops or long grass laid by it, will for some time fix the points of the compass. Mosques, which can be easily distinguished from other buildings, it may be observed, always face the east; and Mahometan graves are always made north and south, the head, which is usually marked by a stone or by a larger stone than the feet, being at the northern end. Such guides as these having been explained, the recruits should be made to fix the points of the compass by them till they are thoroughly understood. All should certainly be taught to fix the points of the compass at night by the pole star and the moon. Then instruction must be given in estimating distances in miles by the eye and by the time taken in riding them, and each man taught to ride at any ordered rate expressed in miles *per* hour. Though trained to trot his horse at 8 miles an hour and to walk him at 4, it will not strike every recruit that, by dividing the time equally between walking and trotting, he may regulate his pace at 6 miles an hour. The arts of reporting what has been seen, and of repeating verbal messages accurately, should be practised. Practice in the elementary matters already referred to may soon be combined by sending the men with messages from point to point, leaving them to find their own way, and ordering them to ride at named rates of speed. A written record of each verbal message sent, of the time of departure, and the pace ordered, might be sent in an envelope with each man. Mistakes can then be pointed out at once, which will add much to the value of the lesson. When a message is delivered, the bearer should be questioned as to matters which may have come under his observation at the point from which he was despatched, or on his way across country. Very early in the course of instruction each man should be taught to avail himself of every means of seeing without being seen when scouting, and to take advantage of such helps as trees and buildings, when time permits, to extend his view. A series of simple questions by which to get information from the inhabitants of the country should be familiar. Here in India a few questions which can be answered by "yes" or "no" or by signs, may be translated into the language of the country, and learned by heart, or carried by the men.* Some instruction should be given in estimating the strength of bodies of troops, the amount of supplies of various kinds, and of judging the suitability of ground for cavalry action; and the habit of keeping an eye open for any thing of military significance, should be encouraged by every possible means. Throughout the instruction, and throughout all instruction to the end of the soldier's career, economy of his horse's strength must

* A paper containing such questions and hints for understanding probable answers, is appended.

be kept in view as the object of the cavalry-man's unceasing care. No horse must for a single stride go faster than the trot, unless it is necessary that he should get over the ground faster than he can go at that pace, and the trot should seldom be a fast one. It cannot be too constantly kept in mind that fast trotting is a pace for harness, but is quite exceptional for the saddle-horse; and that when halted, even for the shortest time, the horse should be relieved of his rider's weight. A scout forming part of an advanced or rear party, or of a flanking patrol, should be taught that his duty consists in seeing all that is to be seen without at any time riding much faster than the body he is detached from, and that this can be done without any difficulty by constantly looking ahead and deciding which are the points of vantage to be aimed at, before those points are reached.

The earliest lessons in actual scouting should be confined to the duties of ground-scouts and combat-patrols, for both of which ample instructions are to be found in the drill book. The duties of a single advanced scout or flanker from a small patrol may be next practised, and then those of the advanced and rear parties and flanking patrols of larger bodies. The importance of keeping one eye, so to speak, constantly fixed on the main body of the party from which the scout is detached, cannot well be dwelt on too much, and the habit of doing this should be confirmed by the instructor frequently changing the pace and direction, or suddenly retiring. Some rules should be adopted, and each man should acquire a knowledge of them, as to the much debated distance which a scout should keep from the body he is scouting for, or from his nearest support. His distance from the body he is scouting for varies according to the strength of that body and the nature of the country. The considerations which regulate it are, (1) that an approaching enemy must always be seen and reported in time to prevent the main body being attacked in unfavourable ground, or so suddenly as to be unable to retire or prepare for action; and, (2) that the scout should never lose touch with the main body and run the risk of being lost, in case it has to retire unexpectedly, or to give chase to retreating hostile scouts. From the first of these considerations it follows that, when the main body is small, the distance between it and its scouts need not be so great as in the case of a stronger party, since a party of three or four men is not easily surprised, can retire anywhere as fast as it can be followed by superior force, and can show all the fight it is capable of in almost any situation. I should say that, during instruction, 400 or 500 yards (and I lean to the smaller limit) is the greatest distance that a single scout should be from a patrol of any strength, while this distance may be reduced, under certain conditions, to almost any extent. An advanced or flanking party consisting of more than one man, may of course keep touch with the patrol and have its most distant scout much further out, if the principle be observed that the most distant man of such a party is its eye, and the others merely connecting links. The system of causing two or more scouts to follow in one another's tracks on a flank, or of placing several scouts abreast as an advanced party, appears to be always objectionable. The advance should always

be piloted by a single scout, though in wooded country, or when approaching towns or villages, this scout must be closely supported; and when more men than one are used as flankers, they should move in an extended line, all except the outermost being regarded simply as connecting files. A strong patrol must, on this principle, extend its sphere of observation to the front and flanks by increasing the number of men detached in those directions, not by pushing single scouts or small parties dangerously far away. Smaller patrols will often find it necessary to move bodily to a flank to gain a point of observation without separating its men too much, or may halt while the commander or a single man, supported perhaps by others, rides to such a point, and, having seen what there is to be seen, returns to normal position. But it is in the nature of things that a small party cannot reconnoitre such an extent of country as a larger one, and it must be remembered that when a broad front has to be searched, either a stronger detachment or a greater number of small ones must be used. In fact extended observation to the flanks of its line of advance forms no part of the duty of a reconnoitring patrol. When the commander of a strong patrol desires to extend his observations far to a flank, he would usually do so by detaching a portion of his command, as a separate patrol, to perform the duty.

I have digressed from the subject of individual training in order to show that the distance of a scout from the body he is scouting for, or from his nearest support, though variable, varies only within certain limits, if regarded from the point of view I have tried to indicate; and that, whether my conclusions are right or wrong, the considerations which govern this variation can easily be generalized into a rule. I know this is a point on which great diversity of opinion exists, but the rule, as I read the principles, should be that the scout or his immediate supporter must never be in such a situation that they cannot at once conform to the movements of the main body; that they should be within easy seeing distance (not exceeding 400 or 500 yards) of the main body itself, or of some one who is in similar touch with it, either directly or through other connecting links.

The general dispositions of a patrol when halted would be much the same as when moving, but, when a halt is made, the scouts might increase their distance considerably (say to 800 yards under the most favourable conditions), if by doing so they can occupy better points of observation; their touch with the patrol or its commander must, however, not be lost, and the general principles of outpost duty will apply. When halted, also, the rear must be watched with as great care as other directions, though, on the move, a separate rear party is only required by patrols of considerable strength. At night the same principles which govern the distribution by day will apply, but will of course necessitate a great drawing together of the different portions of the party, which may often have to move in a compact body with only one or two men pushed on ahead.

A patrol in future will probably often consist of a "group," that is of six or seven men under a non-commissioned officer. This number

of men will therefore be a convenient number to instruct together. I will ask you to follow me through a short typical lesson to such a number of men (say six), the instructor acting as commander of the patrol. The instructor will first explain to all his party the orders he has received. The patrol, which is detached from a contact squadron at A, is ordered to reconnoitre in a north-westerly direction as far as the village B, six miles distant. It is to follow a country road, along which the squadron will advance two hours later. B is to be reached in an hour, if the enemy is not found; and a report is then to be sent back to the squadron, along the road followed by the patrol. At B the patrol is to await further orders. If, however, the enemy is found at any time, he is to be kept in view and followed, information according to the circumstances being of course sent back to the squadron. All reports sent too late to find the squadron leader at A, are to be sent to B; and, if when they reach B, he is not there, they are to move along the road from B towards A so as to meet him.

The name of the village B, and its position with regard to A, must be fixed in every man's mind, as well as any information available about the road which connects the two places. The patrol then marches at a jog trot. The men are sent ahead as an advanced party, for the country is undulating and an unsupported scout would have to halt before passing below the crest of each undulation, or else frequently lose sight of, or be unseen by, the commander. Two men are detached, one to the right and the other to the left, as flankers. The country is open, and the track follows the course of a valley with a slight ridge on either hand. The road at first is level, so that the two men of the advanced party ride, one in front of the other, about 50 yards apart; that being a convenient distance, as we shall see when a crest crosses the road, or when a bend takes the advanced scout temporarily out of direct touch with the patrol. The advanced scout keeps about 400 yards in front of the patrol. The crest of the ridge on the right is 300 yards distant from the track; so the right flanker rides near enough to the crest to see all the ground beyond. He has sometimes to show himself on the sky-line in doing this, but, as a rule, he keeps a little below and within the crest, taking advantage of all good points of observation, and of any trees or other objects on the crest which may, acting as a background, reduce the chance of his being seen against the sky. On the left the ground slopes up gradually for half a mile, so that the crest on that flank is too far distant for a single scout to follow. While he is unsupported, the left flanker therefore rides about 300 yards to the left of the patrol. In that position, it is true, he can only see the ground as far as the top of the crest, and can practically see that no better than the main body. Nevertheless he remains out in order to be nearer to his work when the character of the ground changes during the advance, or when the commander sends a man or two to support him, as he will do if he wishes the ground beyond the crest to be observed. The flanker remains out because, by doing so, he economises horseflesh; though, if the ground were intersected or stony, he might rejoin the main body for the same reason. The commander rides in front of the main body, which now

consists of two men. He makes it his especial business to watch the advanced party, and directs one of the men with him to keep an eye on the right flanker, while the other watches the left. When the road passes over a crest, or a sudden bend takes the advanced scout out of sight, his supporter waits just short of the crest or at the bend, till direct communication is restored, regaining his position afterwards by a slight increase of pace. Presently the crest of the ridge on the right recedes from the road to a distance of 700 or 800 yards, and at the same time, a long strip of unridable marshy ground appears intervening between the ridge and the road. The right flanker then closes in towards the main body, and follows the inner edge of the marsh, so as not to run the risk of being separated from the patrol in case it should suddenly move to the left. Soon a patch of wood appears on the left front, extending about 300 yards to that flank. As he approaches it, the commander sends the two men with him to support the left flanker. They incline towards him, and he at once increases his distance from the commander so as to pass through the wood near its further edge. One of the men supporting him rides into the wood about 100 yards to the left of the road (judging that at that distance he can see the commander occasionally through the trees), and the second rides a similar distance on his left. All three ride parallel to each other and on the same front, each carefully keeping touch with the man next him towards the commander. As soon as the wood is passed, the two men last sent out incline again towards the commander and gradually rejoin him, while the original left flanker closes in to his original interval. This he soon reduces again to 150 yards, because the ground on the left has become dotted with trees, which would make direct touch with the patrol difficult if he rode further out. On reaching a high spot on the track, the commander sees a village half a mile ahead, through which the track passes. He at once halts, and tells the two men with him to trot on and assist the advanced party in reconnoitring the village. The advanced party, seeing support approaching, halts till joined by the two men. The oldest soldier of the four then directs two men to ride round the flanks of the village. As soon as they have turned it, the oldest soldier and the fourth man gallop through it, one about 50 yards in front of the other. Meanwhile the commander approaches to within 400 yards of the village, the flankers keeping abreast of him. The village being unoccupied, the oldest soldier of the advanced party conveys that information by a preconcerted signal to the commander. The commander then rides to the village, where the two men sent on to assist the advanced party await him. The original advanced party rides on 300 or 400 yards; and when all have passed the village, the original order of march is resumed. After this the commander may assume that he has seen, by the help of his field-glass, the enemy's scouts on a hill about a mile away to his right front. He wishes to get close enough to them to keep them in sight; so he starts towards the hill at a steady gallop, all the men of the patrol following him as well as they can. When the top of the hill is reached, the hostile scouts may be supposed to be seen retiring towards a troop of cavalry which is halted in the open nearly a mile away. The

commander then writes a short report of what has taken place, adding that he will keep touch with the enemy. He reads this to one of the men with him, and gives it to him to carry to the squadron leader at A. It is found that the road from A to B was left about four miles from A, and that it is 50 minutes since the patrol left A. The bearer of the message is therefore directed to retrace the tracks of the patrol to the road, and to ride back along that road towards A, to the squadron leader, at the rate of 8 miles an hour.

The lesson may end here. It has of course covered only a very small part of the duties of a patrol, and is given merely as an example of the method to be followed. But a few such lessons, repeated till thoroughly understood, in different classes of country, will do much to give confidence in reconnoitring, and will conduce to workmanlike and intelligent performance of such duty.

I have spoken of preconcerted signals; but I should be glad to see a simple code of signals laid down by regulation for the use of reconnoiters, like those provided for ground-scouts and vedettes, even if it only consisted of two—say, the helmet waved above the head to signify "all clear," and the sword or carbine held up horizontally to intimate the presence of the enemy.

There are many subjects which should be embodied in lessons similar to this, but which I cannot, within the limits of this paper, touch upon. A few of the more important are the carrying of verbal reports; the artifices by which prisoners may be taken, and those by which a messenger may pick his way through an enemy's country; the searching of houses; what to observe about roads, railways, rivers, bridges, fords, &c.; and the treatment of defiles.

Then, under the head of individual training must be included the training of non-commissioned officers, and a few privates with a talent for it, in military topography; which is most necessary, if only to ensure intelligent map-reading. But the excellent official text-book makes any attempt to deal with this subject unnecessary.

I will now proceed to

The Training of the Squadron.

The system of squadron organization which has just been introduced in our service, now makes the squadron the unit of instruction in a sense in which that expression could never be applied to it before; and will, I think, greatly facilitate instruction in such subjects as that under consideration.

Assuming that the officers, non-commissioned officers, and some of the men most likely to be selected for promotion, have been instructed in military topography; that the squadron contains 8 or 10 signallers; and that all the men have undergone such an individual training in reconnaissance as has been sketched; it will be the duty of the squadron leader to keep all up to their work by constant practice, and to accustom the squadron to its work, either as a contact squadron or when ordered to reconnoitre some defined locality; to train each troop and each group to work as a reconnoitring patrol under its own leader; and to teach all

under his command to perform their duty with the smaller officers', or non-commissioned officers' patrols consisting of from 2 to 5 men with a commander.

In doing this, it will be well to distinguish clearly between the duty of a detached patrol, or contact squadron, which moves off to carry out distinct instructions, and forms an independent command; and that of the advanced or rear party, or flanking guard or patrol, which has at all times to keep touch with a larger body, for which it provides immediate security. It would be well, I think, to accept this distinction in its entirety, as it appears to be no arbitrary one, but to belong to the the natural order of things; though it was, I believe, first thoroughly recognized in the provisional regulations issued for the Italian Cavalry manœuvres in Lombardy in 1890. In those regulations it was distinctly stated that reconnoitring patrols are *not* responsible for the security from surprise of the contact squadrons behind them, that those squadrons are *not* responsible for the security of the main body from which they are detached, and that the cavalry screen is *not* responsible for the security of any corps of troops in rear of it; but that the object of these bodies is to discover the position and movements of the enemy, and to prevent the enemy's cavalry from obtaining similar information about their own side. A further distinction must also be drawn between a body, small or large, detached to seek for the enemy in a given direction, and, having found him, to keep touch with him wherever he goes; and one sent out to examine a particular locality, whose duty ends when that locality has been reported on.

With so many men to train in duties which only a few can practise together, the squadron leader must have some system which will enable him to supervise the whole, and secure uniformity of instruction. With this object, I would suggest that he should carefully prepare several reconnaissance schemes of different kinds, some to be carried out by complete troops, some by single groups (as they are defined in the new cavalry drill), and some by smaller officers' and non-commissioned officers' patrols. He could then take out his officers and non-commissioned officers, and instruct them together in the details of each scheme. The lessons thus learned can afterwards be imparted by the officers and non-commissioned officers to their own troops and groups; and it will be thus made certain that their instruction is sound from the squadron leader's point of view.

It will be advantageous, as far as possible, to cause two parties to work one against the other, so as to leave as little as may be to the imagination, and to test individual talent by actual results produced.

When the squadron comes to practise reconnaissance as a whole, or when strong patrols detach smaller ones to carry out some separate portion of the work to be done, the greatest care should be taken in giving precise instructions as to where reports are to be sent. A commander detaching a patrol from his command, may either direct reports to be sent to him to different points at different hours, or to be sent direct to superior authority in rear; and, if he takes the former course, he must either be at the points fixed at the appointed hours, or have

established correspondence posts at them with further orders as to the disposal of reports. To make such arrangements requires time, but the time necessary for them will not be wasted, and the arrangements should never be neglected.

Written, in preference to verbal, reports should, as far as possible, be insisted on; and the transmission of reports in duplicate and triplicate, by different routes, should be practised.

I cannot refrain from saying here a few words about what are sometimes called "*reconnoitring formations*." This term is usually applied to an attempt to do what I believe to be impossible—namely, to enable one commander to conduct a reconnaissance on a broad front, without deputing independent command to his subordinates. He is usually expected to arrange his subordinates, with their small detachments, in a row, and, from a central position in rear, to control them as if by leading strings. The attempt, as far as I can judge, always fails; and, even supposing it to succeed so far as the maintenance of the commander's control is concerned, it is plain that the advance of the whole reconnoitring line must be checked by anything which checks a single part of it—that the delays encountered by a single "*reconnoitring group*," will be multiplied by the number of such groups in that line. It may be added that the country to which such a system can be applied at all, is extremely rare. It appears to me that no party under one man, can reconnoitre on a broader front than is covered by the vision of its flanking parties, and that the object of such a party being to push forward and find the enemy as quickly as possible, its advance should never be hampered by considerations of what its neighbours on the right and left may be about. The first maxim of the *cordon* system of outposts—that all the country watched by the line must be under observation—has some general application to reconnaissance, but the second—that each post must always be seen by those on its right and left—has no such application whatever: and the idea of a reconnaissance conducted by a regular line of observing parties, like a sort of marching outpost line, appears to be based on an entire misconception of what reconnaissance means.

I must now pass on to, and deal very briefly with, my third heading,

The Training and Exercise of larger bodies.

The regiment of cavalry cannot in any sense be considered a unit for the purpose of reconnaissance, and may simply be regarded as four squadrons collected by chance under one command.

In exercising these squadrons together, the principles to be kept in view will be the same as in the case of a larger number, or of the brigade or Division. The training therefore of bodies larger than the squadron, may be dealt with as a single subject.

Since all reconnaissance must be regarded as the prelude to probable fighting, for which concentration of the cavalry will be necessary, and because patrolling is most harassing work to man and horse, the smallest possible number should be employed on this duty. The

contact squadron has no place in advance of a force of cavalry less than a brigade; and contact squadrons, or strong patrols, need never be used, unless they are intended to push many miles to the front, beyond the reach of support, where they must, so to speak, carry their own fighting strength with them, and be provided with a large reserve of men and horses to carry back reports. Reconnaissances in advance of small columns, or those which it is known will not extend far to the front, should usually be made by weak officers' or non-commissioned officers' patrols. Let me instance the reconnaissances which are made when the troops in such a garrison as this are exercised as two opposing forces. The distance between them is, at most, a few miles, and a fight is known to be imminent. Under these circumstances, a squadron contains a far greater number of men than is required to carry out the reconnoitring for either side, while to detach one seriously weakens the force remaining in hand for the fight. In such cases, I feel sure, a very small number of weak patrols under officers or non-commissioned officers will be found to do the work quite as satisfactorily as whole troops or squadrons, while by sending such patrols out from different squadrons, the services of the best men in each will be secured, and the fighting power of the force retained in hand will not be appreciably diminished.

With regard to the more extended reconnaissances carried out by the brigade, division, or even larger force, I cannot now do more than put together a few general principles, which are, for the most part, deduced from the reports of recent foreign manœuvres, or borrowed from the writings of a few recognized authorities.

The commander of the screen must retain as large a force as possible in hand. In the case of a very large body (say a division) covering a broad front, this force may be divided into two, or even more, columns. Contact squadrons will be pushed out to the front from these columns, and patrols from the contact squadrons. In addition, officers' patrols may be sent out by the commander of the whole, either to push on to special points in advance of the contact squadrons, or to reconnoitre ground between the regions assigned to adjacent squadrons. Under no circumstances should a contact squadron be expected to extend its observations over a broader front than 5 miles, or one of the weaker patrols over a broader front than 2. The normal distances between the different portions of the screen, before touch with the enemy is gained, may be taken (as a rough guide) as follows:—The reconnoitring patrols from 4 to 6 miles in advance of the contact squadrons, and the contact squadrons from 10 to 20 miles in advance of columns. Each column, and each contact squadron, will of course provide for its own immediate security by an advanced guard and flanking detachments. During the advance the commander of each contact squadron will send patrols to the front with orders, as a rule, to await him at fixed points on the line of his advance. Some miles before such fixed points are reached by the squadron, relieving patrols will be sent out to push further to the front, and, in their turn, be similarly relieved and picked up by the squadron. The contact squadrons should, if possible, be relieved every

second or third day in a similar way. Each patrol from the contact squadrons, or from the columns, and each contact squadron, is in the first instance given a line to follow, to which it must adhere till it comes into contact with the enemy. Having once found the enemy, it must cling to whatever hostile troops it has gained touch with, and follow those troops wherever they go. The contact squadron replaces any of its patrols which may be drawn to a flank in performing this duty, and similarly any gaps in the general front to be reconnoitred, caused by contact squadrons being in the same manner drawn away from the lines assigned to them, must be filled by fresh patrols or squadrons from the main columns. The transmission of information to the rear may be aided by the establishment of relays of correspondence posts detached towards the front from the main columns. As contact with the enemy becomes closer, the contact squadrons will gradually work closer to their patrols, and the main columns closer to the contact squadrons. The columns, however, will be much influenced in their movements by the necessity for meeting the masses of the enemy's cavalry in advantageous ground.

Seeing that the arms and characteristics of cavalry have been, since the earliest historical times, much what they are to day, and that the duty of reconnaissance has always pertained especially to this arm, it may seem strange that there should still be any need to discuss the elements of the subject before us. The explanation is that the records of war seldom give much detailed information regarding the performance of this important duty, so that the experience of our predecessors is for the most part lost to us; and that the very extended reconnaissances rendered necessary by modern conditions, form a new feature in warfare, and have, in no campaign that has yet taken place, been so thoroughly carried out as it is probable they will be in the future.

In conclusion a few points of general importance in connection with my subject may be touched upon.

It seems remarkable, considering the importance of time, direction, and extended observation, to all engaged in reconnaissance, that no watch, compass, or—if we except signallers' telescopes—any field-glass, forms part of the equipment supplied at public expense to our cavalry regiments.

In the general matter of equipment, it is pretty generally admitted that room for improvement exists. Our horses are at present over-weighted in a manner which must seriously cramp our power of extended reconnoitring, and hamper us in the performance of every duty: and I do not believe that there are any obstacles to improvement in this respect, other than the ever-obstructing prejudice against change, and the familiar difficulty of obtaining due recognition for the urgency of any innovation which involves expenditure.

In practice during peace, I fear our love of the excellent quality called smartness, sometimes tempts us to attempt reconnaissances without taking time to make sound plans, or to issue the carefully considered orders necessary to carry them out; and to launch ourselves into such operations at an imposing rate of movement quite incompatible

with service conditions. Quickness is, no doubt, the essence of reconnoitring; but there is no class of duty in which undue haste is more dangerous or more out of place. More or less time is absolutely necessary before a reconnaissance is undertaken, and the enormously increased waste of horseflesh, which would be caused on service by sending horses long distances at unnecessarily rapid rates, cannot be too carefully guarded against. It would be well to recognize some standard rate of speed at which reconnoitring parties may, under ordinary conditions, be expected to advance. I do not believe that, in the most favourable country, even a small patrol can, without much galloping, push its way to the front much faster than 6 miles an hour, exclusive of halts to feed and rest men and horses. In this connection, let me quote a paragraph from the cavalry regulations of 1887, which, I think, contains much food for reflection. It is to be found under the heading, "Instructions for the Division or Brigade covering an Army," and runs "as follows:—"The following is the approximate time necessary for a "march of fourteen miles, when all the precautions necessary in the "presence of an enemy are observed, and he is known to be in the "neighbourhood :—

	On a good road.	On a bad road.	Under the most unfavourable conditions—snow, frost, &c.
"1 Regiment or Battery			
H. A....	4 hours	6 hours	9 hours
"Division of Cavalry	4 hours	7 hours	12 hours
"The above is the time the head of the column will take."			

Within the limits of a short field-day, it is seldom possible to estimate justly the value of the information supplied to the commanders of sides by their reconnoitrers. Its accuracy is necessarily only roughly tested, and the rapidity with which it is conveyed to the right points often escapes comparison with what ought to be possible. If I may offer a suggestion on such a subject, let me say that I believe the necessary time would be well spent, if occasionally, during field-days and manœuvres, operations were suspended for sufficient time to allow the commander of each side to record the actual distribution of his own force, and all the information regarding the distribution of the enemy which his reconnoitrers have supplied him with. A reliable test would then be applied to the work done, and I think we should arrive at very valuable conclusions as to what is possible for reconnoitrers, and how it can best be accomplished.

In dealing with my subject, I have not hesitated to put forward opinions of my own, many of which, I admit, are open to discussion, and in many of which those far better qualified to judge than I am, will, I know, not concur. I have, however, made my own humble opinions my groundwork, and have spoken freely in the first person, because I believe that to be the most convenient way to draw out from others the results of their individual thought; and because I believe that much thought has still to be applied to the training of our cavalry for reconnaissance, before we can boast that we are capable of performing in the most efficient way, in time of war, that arduous and never-ending task.

BRIGADIER-GENERAL M. PROTHEROE, C. B., C. S. I.: I believe there are several cavalry officers present who are desirous of taking part in a discussion on the excellent lecture which we have just heard: I will therefore merely remark on one point. Captain Pilkington says that it is necessary to distinguish between the duties of detached reconnoitring bodies of cavalry and those providing immediate security for larger bodies, such as advance or rear parties, and refers to the provisional regulations issued for the Italian cavalry manœuvres of 1890, where this distinction is thoroughly recognized for the first time, and it is laid down that a cavalry screen is not responsible for the security of any corps of troops in rear of it.

I think so far as the army in India is concerned, in practice the principle that the cavalry screen is not so responsible is already recognized.

On the march from Cabul to Kandahar in 1880 the cavalry brigade, consisting of the 9th Lancers, 3rd Bengal Cavalry, 3rd Punjab Cavalry, and one regiment of Central India Horse, was required to form a screen to cover the advance of the army; and this they did by one regiment being extended over 5 or 6 miles of front, the remainder being held in reserve, the whole brigade being from 10 miles to a couple of days' march in advance of the remainder of the army, which marched, taking its own military precautions for the security of its front and flanks. It was here I think clearly recognized that the screen was not for the protection of the main body, but to obtain information of the enemy and to prevent his obtaining information regarding our troops.

CAPTAIN E. E. M. LAWFORD, 1st Madras Lancers, A. A. G.: After the very flattering way in which Capt. Pilkington has referred to my lecture of last year, I feel somewhat loth to criticize his practical lecture to-night; still, as he has invited criticism, I should like to offer a few remarks in a friendly spirit on one or two of his statements, which I think are open to discussion.

First, Captain Pilkington states:—"Let me frankly say, that I believe reconnoitring to be, in modern war, a more important duty of cavalry than fighting." I must say, it seems to me that manœuvring in mass formation, the attack, and fighting, are the most essential things to perfect our cavalry in, and that reconnaissance only occupies the second place, being the preliminary, leading up to fight in mass. As the French Commission on cavalry laid down:—"Cavalry having gained touch of the enemy, operates in advance of the army; it draws a curtain to cover the movements of the latter, and engages the enemy's cavalry, by means of successive shocks, gradually increasing in intensity, until the skirmishes of reconnaissance become charges in mass."

I would ask you now, to imagine two great nations at the very beginning of war, equal in cavalry. The cavalry of one nation having made mass manœuvring and shock tactics its speciality, the other having given its first care to reconnaissance and detached duties. Now the cavalry screens which both these nations throw out, must eventually come to something definite: they can not be for ever watching each other, avoiding fighting, and playing at hide-and-seek. One side will make a rush with an enormous mass of cavalry, will brush

aside the screen, and then will be the time when fighting and perfection in manœuvre will come in.

I say, and I believe, that that side which is slow and clumsy in manœuvre, unaccustomed to work in large masses, and half trained in the use of its weapons, will be simply ridden down, and hunted from the field; and that the victorious cavalry will press on, being stopped by nothing, till it comes right up to the enemy's infantry and artillery, and under fire of the repeater, before which nothing can stand.

Colonel Trench well describes the results of these first successes:—"The prestige which naturally attaches itself to the victors in the first contest of a campaign, and the moral effect produced by such first successes, are advantages for which too high a price can scarcely be paid. Hence it is, that to ensure the winning of any such first contests, and to gain the advantages at the outset of a campaign, which only a highly trained cavalry can secure, has during the last 10 years been one of the chief preoccupations of the leaders of the German army." (This was written eight years ago).

I think, gentlemen, I am right in saying, it has been the pre-occupation too, of our cavalry leaders, as is shown by the work done at Muridki and Aligarh camps.

Now, as to the training of the individual soldier in reconnaissance. I don't think any hard or fast rules should be laid down as to the way reconnoitring should be conducted; as Prince Kraft says:—"No infallible scheme or universal plan can be laid down for the conduct of the service of reconnaissance by cavalry. The principles which govern the manner of the discharge of this duty, depend so very much upon the character of the ground, upon the tactical situation, upon the efficiency or inefficiency of the enemy, upon his distance, and upon many other circumstances, that they will vary in each particular case, and must be carried out with sound common sense, in conjunction with a full acquaintance with the function of cavalry and with the strategical situation. Reconnaissance is not guided by distinct forms and axioms, as the service of security is."

I am entirely in accord with what Captain Pilkington says about the necessity of impressing on all the difference between the service of security and the service of reconnaissance. Prince Kraft in his letters on cavalry, published many years ago, insisted on this, as also did Verdy von Vernois in his book, the "Cavalry Division in conjunction with an army." The Italian cavalry in Lombardy in 1890 can therefore hardly claim credit for being the first to recognize these principles.

Lastly, I think Captain Pilkington hits the right nail on the head, when he says:—"Within the limits of a short field-day, it is seldom possible to estimate justly the value of the information supplied to the commanders of sides by their reconnoiters &c." A very common complaint heard after our field-days, is:—"My cavalry sent me in no information."

The reason of this undoubtedly is that the cavalry reconnoiters are not given time to thoroughly reconnoitre the enemy's dispositions, and to send in written reports on them. As a rule, at the commencement

of our field-days, at a fixed time, out go our cavalry patrols and reconnoitrers at a gallop, followed at a trot by the main bodies of the cavalry, and by the infantry and guns at a walk. The enemy is generally posted some five miles off, and they open the day in a similar manner.

Naturally the opposing patrols and reconnoitrers, come into contact in a few minutes, they gallop back to their cavalry, which then forms for attack, and a cavalry action at once comes off.

Umpires then separate the opposing cavalry forces, and for the remainder of the day, these amuse themselves by making dashes at each other, from distances of about 1000 yards, or else they retire and make wide flanking movements to try and get round the enemy.

To obviate all this, I would suggest, either separating the opposing troops much more at the commencement, say, at starting, they should never have less than 10 miles between them; or forbidding any troops on either side to move, except these patrols, until the latter had had a quarter of an hour's start.

COL. HICKMAN, 21ST HUSSARS: I agree with the lecturer that reconnoitring is the primary duty of cavalry, on the plea that they are of more use to the army and the general commanding by getting information of the movements and whereabouts of the enemy; while they can do little permanent good by attacking infantry or artillery, and even if victorious against cavalry, they are to a certain extent demoralised for a time; while if defeated, they are a serious loss to their side.

I disagree with the lecturer that precise regulations should be insisted on for reconnoitrers, on the contrary I think that scope should be given to common sense, to suit the ever varying conditions of countries &c.

I think the proposed training of the recruit is too elaborate and theoretical; I doubt if time could be found for it now-a-days.

I disagree with the opinion of the lecturer that scouts, flankers &c., should be kept out permanently by patrols &c. Rather I think that patrols should work entire, and men be detached by word to search suspicious places.

I am not of opinion that when contact squadrons are covering large bodies, the patrols sent in by them should await the squadron at fixed points, and so be relieved. This would mean that the relieving patrols would have to ride very fast to gain their distance, which would be a great strain on horseflesh.

I regret the lecturer was not able to give more attention to 'the transmitting of information';—experience has proved that at field-days and manœuvres the difficulty does not lie in gaining the information, but in transmitting it.

COLONEL WEST, R. H. A.: I thoroughly agree as to the precedence of reconnoitring to fighting, given by the lecturer, and it struck me on reading over the first few lines of the lecture, but, as I read on, I saw it was merely a slip as to the order of precedence. With regard to what Captain Lawford says as to the fighting in mass, I consider the mass is little or no use without good reconnoitring, and that Captain Lawford has taken a rather onesided suppositious case.

I do not think reconnoitring is by any means an easy thing, and that in the first instance, it is the most valuable and important duty of cavalry. From what I have seen of information given to artillery by cavalry I would certainly rely on my own reconnoitring groups; this is not a local reference as to want of information given by cavalry, but from what I have seen of work at Aldershot and elsewhere.

I think the lecture a most excellent elementary lecture, and have no doubt if Captain Pilkington follows it up by the work possible by large masses of cavalry he would give an equally excellent lecture. I believe no one as yet knows the value of work possible by cavalry, horse artillery, and machine guns, pushed carefully, well, judiciously, and with enterprise into the front, and that they would be able to alter the whole feature of a campaign. Leaders are the great thing wanted, and they should be young.

MAJOR C. H. WESTMORLAND, OFFIC. A. A. G., Hyderabad Contingent: I disagree with what the lecturer said on the subject of "precise regulations." It appears to me that it would be a very difficult matter to frame these precise regulations, so that they might be applicable to the various theatres of war our army has to fight in.

Up to quite lately our drill books have been written entirely with the object of training our men for European warfare, with the result that while acting to a certain extent on the general principles we have been taught, we have had to alter the details in almost each campaign.

This is certainly the case in reconnoitring, and I think that it would be better to teach a few clear general principles and rules thoroughly rather than a mass of detail. These combined with continuous practice under as varied conditions as are possible in peace time will tend to make men think for themselves rather than depend on the book.

For somewhat the same reasons I do not agree with the lecturer's opinion that at instruction a scout should be taught that from 400 to 500 yards is the greatest distance he should be from his patrol. I think it would hardly be possible to fix any particular limit. Taking the case of a patrol marching along a road with flankers out at say some 300 yards distance and within view of the patrol, cases would often occur where ground would be visible to the flanker which would not be so to the commander of the patrol. Supposing the scout sees a small wood or other cover some 300 or 400 yards to his flank. Would it not be rather dangerous to teach him to think that because it was more than 500 yards away from his patrol he need not visit it?

I can quite understand that scouts must not be allowed to gallop clean away from their patrols, but I would suggest that possibly some better way of preventing this than by fixing a hard and fast limit might be arrived at.

MAJOR C. E. COFFEY, R. A.: Of course it is true that in the last great Franco-German war, we do not find the great shock tactics which Captain Lawford has spoken about, because it seems to me that the French had no cavalry, which from its training was capable of meeting the German cavalry with an equal screen; and therefore the shock tactics did not come into force, through one screen trying to penetrate the

other. But I certainly agree with Colonel Hickman that reconnoitring is the first duty. Take for example the battle of Mars-la-Tour, which is distinctly a cavalry fight, and there we see the German cavalry regardless of exposure, sacrificing themselves for a distinct object in view, and this is the only occasion we see shock tactics used in this war. On the other hand at Le Mans we have an enormous cavalry force on the ground, namely the 1st, 4th, and 6th cavalry divisions, and though the ground may not have been favourable to cavalry owing to the weather &c., the state of the French troops was such as to present many favourable opportunities for the successful employment of cavalry; but the cavalry was distinctly held back and employed chiefly in reconnoitring, and only launched forth after three days fighting and when the battle was practically over, in order to take advantage of the confusion that reigned in the town and suburbs.

CAPTAIN BOND, R. E.: As regards the training of the recruit, I suggest that he should always have a definite object, in the form of a skeleton enemy, to look for, and it would be well if we copied the Germans in this and allowed no tactical exercises without a skeleton enemy, however, small, if only a section of men, or a man with a bannerol. The instruction is best given by officers' patrols, of which Prince Kraft speaks as being the best training medium. These should be used as much as possible in times of peace, and in war. Prince Kraft says they usually gain their end better than larger bodies such as contact squadrons and large patrols. He points out that they often obtained their object where, and at the time that, a squadron failed, it having by its greater size and perhaps added boldness drawn on it the enemy's artillery fire, or been drawn into a fight, a thing fatal to reconnoissance. I regret that the lecturer had not time to speak of cavalry scouts on the battle-field, gaining information under fire as at Le Bourget, and by their mobility escaping with valuable information, where infantry must have been rendered *hors de combat*.

Though reconnoissance may be the chief duty of cavalry, it is a pity to forget that smokeless powder and small-bore rifles may make this duty much more difficult, whereas it is possible that cavalry on the battle-field may charge and charge home against infantry with less chance of being stopped by the small-bore in the days to come.

CAPTAIN PILKINGTON (in reply): I do not think that so late in the evening any elaborate counter-criticisms are expected or wished for from me. I will touch, as briefly as possible, on what has been said. General Protheroe said that the true limits of the responsibility of the cavalry screen had long been recognized in India, and quoted the last Afghan war as a proof of this. I well know, though I have served but a short time in India, that in many matters the army in India is ahead of the army elsewhere, but I have never doubted that the true principles of cavalry screening have often been recognized in war. What I should perhaps have said is, that they have not been recognized in any written regulations before the Italian cavalry manœuvres of 1890.

As to what Captain Lawford said regarding the relative importance of battle action and reconnoissance as cavalry duties, it was of course

much more difficult than important to compare the value of these different duties. Though I cannot quote at this moment from the speech in question, I think I can safely say that His Excellency Lord Roberts conveyed in his speech at the conclusion of the Aligarh camp, the opinion that reconnaissance is about the most important duty of cavalry. I think such an opinion, expressed at such a time (just after a cavalry camp of exercise devoted almost entirely to mass tactics) has a peculiar significance, and I know that the opinion of no living Englishman on such a subject would carry more weight than Lord Roberts' among British officers.

No one recognizes more than I do that the cavalry recruit is now worked as hard as he ought to be, sometimes perhaps harder. But Colonel Hickman misunderstood me in supposing that I wish to see more daily work demanded from recruits. What I want to see is a different kind of training from that now in vogue, a training that would cultivate individual intelligence more, and would not lead each man to close his mind to all further knowledge, and consider himself a master of his profession as soon as he was pronounced a "trained soldier." I recognize the difficulties, but do not think them insurmountable, and I intend in my own work, to aim at a more liberal training for the soldier so far as I can. Colonel Hickman objected to a good deal that I said about the distribution of scouts from patrols, and favoured the keeping of patrols together. I was quite prepared for difference of opinion on this point, and I have little to add to what I said in my lecture on the subject, but, from experience in teaching men their work, I am very firmly convinced that it is better to detach men in the direction in which they are to keep their eyes, in order to secure a better look out and for economy of horseflesh. Colonel Hickman objected to my reducing the main body of a patrol of six men to two with a commander, but I can see no objection to this. I would rather regard the normal main body of any small patrol as being the commander alone. The men marching with the commander become useful only when they are required to help in scouting or to carry messages. There can be no doubt that the transmission of information is one of the most difficult and one of the most important parts of reconnaissance. I actually wrote a good deal for this lecture on the subject, but cut it out to bring what I had to say within reasonable limits. I had to content myself with indicating, by our short typical lesson, the manner in which I would suggest that instruction should be conducted, but I had to pass over with a bare mention several important subjects—the transmission of intelligence among them. I felt it almost impossible to deal with such subjects in any detail without giving to them much more time than was possible in a lecture. Colonel Hickman also taxed me with laying too little stress on the importance of reconnoiters abstaining from fighting. I said little on this subject because I think its importance is recognized by all my audience, and because it is dwelt on so carefully in every text-book and manual.

Colonel West made a suggestion that I should, on some future occasion, read a lecture on the use of larger bodies of cavalry in combination with horse artillery and machine guns. The suggestion is very

flattering, but I can offer a much better one instead of it. It is that Colonel West should, on some future occasion, deliver a lecture on the use of horse artillery and machine guns in combination with large masses of cavalry.

As regards the arrangements to be made to ensure information being sent to the right point. This is a matter of the greatest importance. I said something about the squadron commander's duty in the matter of informing his patrols where he was to be found, and I might have said a good deal about the duty in this respect of superior commanders. There is no doubt that no amount of training will enable men to carry reports to the right point, if they are left in the dark as where that point is.

Major Westmorland is inclined to doubt whether the distances I allow between scouts and parties scouted for are elastic enough, and Colonel Williams evidently thinks that the arms of modern infantry are too deadly to allow concentrated patrols gaining much information about infantry. I do not suppose that scouts could avoid being shot from time to time, but I have great confidence in the difficulty of hitting a moving horse at an unknown range. I think that it is too often taken for granted that a cavalryman and his horse could never be missed because they present so large a target. I would point out that the ratio between the sizes of the targets presented by the infantryman and the cavalryman is a small one compared with the ratio between the rates of movement of the one and the other, and that therefore the cavalryman's chance of getting over a given extent of ground under fire is better than the infantryman's. As to the slow rate at which Colonel Williams complains that it is suggested cavalry should reconnoitre, certainly, if we came down to four miles an hour with very favourable conditions, there would be some risk of the infantry getting in front of the cavalry as Colonel Williams suggested. I do not think, however, there is much fear of the infantry getting in front of the cavalry in practice, but it must be remembered that reconnoitring and fighting are very different things, and that, if the cavalry for any reason, could not open the way so fast as the infantry could march, the infantry must wait till they know where to march to. If cavalry could, in given conditions, only reconnoitre at the rate of four miles an hour, I feel sure I am well over the mark in saying that infantry could not reconnoitre in the same conditions faster than one mile an hour.

I am glad that Major Coffey endorsed what I said as to the importance of reconnaissance, for his opinion has the weight of experience in the greatest of modern wars. I think Captain Bond does not quite give British officers credit for as intelligent methods of instructions as they deserve. I myself have had two experiences with different classes of men who were alike in one thing—that they insisted on intelligent teaching. I have had the command of local troops in Australia, who were no respecters of persons, and did not hesitate to express what they wanted to make them understand their work. I have also seen something in the West Indies of the system by which young American citizens are made into enthusiastic sailors in the training ships of the American navy. From these experiences I have learnt one great lesson—that it takes something more than

instruction in dry facts to arouse enthusiasm, but that other feelings than those on which we chiefly rely to direct the interest of our men towards their duty, may be made to inspire the most admirable zeal.

I may have misled Captain Bond by speaking of "*officers and non-commissioned officers' patrols*," whenever I mentioned what are usually called "*officers' patrols*," and so caused him to think that I did not propose to make sufficient use of such patrols. Captain Bond, however, I think, seems to underestimate the acquirements of many senior non-commissioned officers of cavalry, for he not only does not recognize that they might lead small patrols and perform the same duties with them as officers, but he spoke of instruction in reconnaissance as being peculiarly a duty that must be performed by officers. I will just mention that a non-commissioned officer is just now, in the squadron which I command, beginning a course of instruction in military topography for non-commissioned officers and men, and that he is a perfectly efficient instructor, and fortunately one of very many efficient instructors in such subjects to be found among the non-commissioned ranks of our cavalry.

MAJOR-GENERAL C. J. EAST, C. B., Commanding Secunderabad District: Captain Pilkington at the commencement of his lecture touched on the question of the theoretical instruction of recruits, and I quite concur in his views on this subject. He has shewn us how necessary this is by the great want of knowledge on many minor but important points often shewn by the young soldier. I think myself that the very best form of instruction is when theory and practice can be brought together. Theoretical instruction has been carried on in foreign armies much longer than with us, and is taught in a more systematical manner. It is only since squadron and company training has been started in the British army, that any real effort at the theoretical instruction of the soldier has been made. Before I came to this command I was able to attend many more lectures by squadron and company commanders than I have been able to do here, and I have on these occasions heard many excellent lectures. There is one point to which Captain Pilkington referred which is I think of great importance, and that is that lectures should be enlivened by instances taken from military history. Many of you probably when reading military history note down examples which will be of use when lecturing to your men. I might mention here a book lately published, which teems with the smaller and personal details of campaigning, and furnishes numerous instances useful as illustrations in the lectures you give your men. It is the life of Lieutenant-General Baron de Marbot of the French army, who went through nearly all the wars of the 1st Empire. It has lately been translated into English. There are also some useful little books translated into French from the Russian by General Dragomiroff. He is one of the most highly considered Russian generals of the day, and although some of his ideas are not quite in accordance with the customs of our service, there is a great deal to learn from them regarding the individual instruction of the soldier. Although not bearing on the subject of reconnaissance, I may mention a few hints he gives regarding the training of soldiers on their duties on guard. After the instructor has explained

to the men the importance of not leaving their post on any pretence, he places one of them on sentry and tells him to carry out his duties.

Presently he goes up to him and says, "I think there is some thing wrong with your rifle, let me look at it." If the man gives it up, he says, "What you surrender your arms when you are placed on sentry, you deserve to be put in the guard room." The instructor then goes to another man who has been posted on sentry, but who to a similar demand is supposed to refuse to give up his rifle. He then says to him, "Well done, I see you do your duty well, here is a rouble as a reward for you." If the man takes the money, he says "What! you take a money reward for doing your duty, you are not fit to be a soldier, and ought to be tried by court martial." And so he goes on with other instances for testing the men in their knowledge of work and sense of duty. I mention this to shew that in the Russian army, which probably would not claim the first place amongst the armies of Europe as regards theoretical instruction, it is not by any means neglected with them. I quite agree with Captain Pilkington that our standard of reconnaissance is not high enough. Captain Lawford mentions that after manœuvres the complaint is often heard that the cavalry brought no information. I am glad to say that I have on many occasions heard that the information brought by the cavalry has been excellent, and I have often found it so myself.

There is one point on which great stress has been laid by some speakers this evening, especially by Colonel Hickman, and that is the necessity of a proper and rapid transmission of information. I think it will often be found that those officers who complain, when holding superior commands at field operations, that the cavalry do not give good information have as a rule to thank themselves that this is so. They often give no instructions to their cavalry commanders, and take no trouble to ensure that messages shall reach them quickly.

But the information furnished by cavalry ought always to be good. It would be a good plan if the person who writes a message would before sending it off try to look at it from the point of view of the person who is to receive it. And it should be remembered that negative information is very often of as great importance as actual details about the enemy. All these things have to be taught very carefully to the men, and in many cases it falls to the lot of subalterns with very little experience to be the instructors. When you have experienced squadron and company commanders to instruct their men, I say by no means tie them down to any strict rules of procedure. But these are not always available. In discussing this question we have to think of what is required for the British army as a whole, and not merely to the portion stationed in India. Here we undoubtedly have exceptional opportunities for learning our work and instructing our men. But, with the exception of the troops at Aldershot and the Curragh and at a few other stations, very few of those at home have really good opportunities of learning reconnaissance. Take again the Yeomanry, surely some guide book on the subject of teaching reconnaissance would be useful to them. I think a cavalry officer who would gather together what has

been published by individual officers on reconnaissance, including such valuable papers as we have heard to-night, who would pick out all the valuable hints contained in books like Captain Biensans', von Verdy du Vernois, and many others, would be rendering a most valuable service to our cavalry. Many different ways would be shewn of carrying out the same work, and an officer would be free to choose his own line without being tied down by any hard and fast rule. That we do want such a guide I think is evident.

Captain Pilkington refers to the hard and unremitting labour required to keep the short service soldier up to the standard now necessary. The labour is no doubt as he says, but the result fully compensates for it. In the old days of long service, we had nothing like the same efficiency in any arm of the service that we have now. When a soldier had a long time to serve, there was no necessity to teach him his work in a hurry, and the result was that often he was not taught it at all.

As regards the relative importance of fighting and reconnoitring for the cavalry, I think that both must go together, and that nothing is gained by laying more stress on one than the other. It is undoubtedly the ultimate object of all training, reconnoitring, and manœuvring, to get at the enemy and beat him. But we must recollect that whereas reconnoitring is a daily and constant duty, fighting for cavalry, especially on a large scale, does not happen very often. I certainly agree with Captain Pilkington that enough attention is not as a rule paid to instruction in reconnoitring, and in this respect it must be remembered that it is waste of labour to obtain accurate information, unless proper means of transmitting it rapidly to the person for whom it is intended are carefully studied, arranged, and understood by all concerned.

Several suggestions have been made this evening for giving the cavalry opportunities of doing more practical work in the way of reconnaissance at field days. The time when this work can be done in a thoroughly satisfactory manner is at manœuvres; there are difficulties in our field-days carried out in the neighbourhood of cantonments, which are not easy to overcome. One of these, as regards Secunderabad, is that the distances are so great. In camp all the troops are close together, and most likely on the manœuvre ground. At this station, the troops at one end are stationed six miles from those at the other. We have not only long distances to go for concentration, but also long distances to the manœuvre ground; this is independent of the work to be done when the manœuvres commence. At an ordinary field-day here, some of the troops have to cover 16 or 17 miles, and this as a rule is sufficient. Another suggestion was that occasionally the troops on both sides should be halted, and stock taken of information received and position of the troops. I have halted troops occasionally at field-days with the object of ascertaining the positions of both sides in detail at a particular moment, but the result was never satisfactory. It is almost impossible to get all the troops to halt at once, and as some of them continue to move on, their relative positions at a particular moment are not ascertained. There was also a suggestion that manœuvres should be carried on from one day to another, commencing on the second day

where the operations were broken off on the previous day. This has been done occasionally, and I think it is a good thing to do now and then.

Before making my concluding remark, I wish to congratulate the cavalry, on having given us two most excellent lectures, the one last year by Captain Lawford, 1st M. L., and the one we have just heard by Captain Pilkington.

I look upon Captain Pilkington's lecture as extremely valuable, and for two special reasons. The first is that the lecture is original, and is therefore more interesting than a simple compilation from the principal writers on the subject he has chosen. He has given us something new to think about. Secondly, the information it contains is based on his own personal practical experience in the field, gained whilst instructing his own squadron; it is not evolved from his inner consciousness whilst sitting at a desk.

I am sure you will all of you authorize me to convey our best thanks to Captain Pilkington for the very interesting lecture he has given us.

QUESTIONS AND ANSWERS (IN HINDUSTANI) FOR USE WHEN RECONNOITRING.

English.	Hindustani (with literal translation in small type.)
What is the name of this village? ...	Iss ga-on ka nam kya hai? this village of name what is!
Conduct me to the chief inhabitant.	mujh ko patel ke pas leja-o. me to chief inhabitant near to lead Instead of " <i>patel</i> ," the following words might be used in towns or larger villages :— tasildar, paishkar, (native collector) (native sub-collector) kutwal (police inspector.)
How far is this place from——? ∴	_____ se yih jagah kitni dur hai? (name of place) from this place how far is!
Point out the road to—— ...	_____ ka rasta batla-o. (name of place) of road show
Have you seen any soldiers here? ...	kya tum kisi sepahion ko yahan what you any soldiers (to) here dekhe? seen?
When did you see the soldiers? ...	tum sepahion ko kab dekhe? you soldiers (to) when seen?
Where did the soldiers go? ...	sepahian kahan ga-e? soldiers where went?
When did you see the soldiers? ...	tum sepahion ko kab dekhe? you soldiers (to) when seen?
How many soldiers did you see? ...	tum kitne sepahion ko dekhe? you how many soldiers (to) seen?
Horse-soldiers... ..	sowar or risale wale.
Foot-soldiers	paidal or paidal wale.
Just now... ..	abhee.
Yesterday	kul.
This morning... ..	aj fajar.
Yesterday evening... ..	kul sham.
Yes	han or ho.
No	nahin or na.
Miles	mil. The usual measure of distance is the cos, which is 2 miles.

Numerals.

1.—ek.	9.—now.	17.—sathrah.	60.—sat.
2.—do.	10.—das.	18.—atarah.	70.—sathar.
3.—teen.	11.—gyrah.	19.—oonnees.	80.—assee.
4.—char.	12.—barah.	20.—bees.	90.—nowad.
5.—panch.	13.—terah.	21.—bees par ek.	100.—sow.
6.—che.	14.—choudah.	30.—tees.	200.—do sow.
7.—sath.	15.—pandrah.	40.—chalees.	1000.—hazar.
8.—aut.	16.—solah.	50.—pachas.	

WARFARE IN MOUNTAINOUS COUNTRIES.

By Lieut.-Colonel E. PAQUIE, 140th Regiment of France

(Contributed by Major H. C. C. D. SIMPSON, R.A.)

INTRODUCTION BY CONTRIBUTOR.

As is doubtless generally known, France, Austria, and Italy have made enormous strides in the last seven years in the organization of small special bodies of troops for mountain service on their Alpine frontiers.

The former power is perhaps the most advanced in this respect, and as regards one branch of these units, *viz.*, the mountain artillery, she has the most numerous, and perhaps the most efficient of any. The following extract from an Italian Journal gives some idea of the details of the constitution of the mountain groups of these countries.

The greater strength of the French Alpine columns may be accounted for by the fact that in case of a war against the triple alliance, Austria having no Alpine frontier contiguous to France to defend, would deem it prudent to lend her Italian ally the assistance of her mountain forces.

"The fatal accident which recently happened to a party of *Alpini*, or mountain soldiery, while engaged in their arduous duties near the Italo-French confines, and whose dramatic particulars were noted in this column, has intensified the interest of the general public in a matter that has of late years engaged the anxious attention of those responsible for the defence of the country. The necessity of a body of men and officers specially armed, trained, and exercised for a species of struggle differing in principle and practice from the warfare of the plains almost as widely as does sea-fighting from either, had long since been insisted upon by many able theorists, but to General Ricotti must be assigned the merit of making the idea a living reality. Once started, it rapidly grew. Beginning with 24 scanty companies, the *Alpini* soon became 36; these shortly doubled into 72, grouped in 22 battalions and 6 regiments; while we have now 75 companies, divided into 22 battalions or 7 regiments. Otherwise expressed, the *Alpini* have within the short space of twenty years grown from 3,000 men in peace and 5,000 in war to 9,000 in peace and 40,000 in war. In the latter number, however, must be included the Alpine companies of the mobile and territorial militia. Parallel with the *Alpini* or mountain infantry grew another corps, which one would have almost thought a natural and inseparable corollary to it--the *Batterie de Montagne* or mountain artillery. But this corps started later owing to powerful opposition, made its way in spite of many obstacles, and indeed, for some years led a stinted and almost illegitimate life. Now, however, thanks to the tenacity of purpose and well-directed zeal of those who saw and persistently demonstrated the important services which such a body was capable of rendering, it has

become a fine regiment of 8 batteries,—the creation of the present Minister of War, General Bertole-Viale. It may here be remarked that Austria had long since organised special troops for mountain warfare, and used them to the detriment of the Italians in the defence of the Tyrol, in the war of 1866; whereas France, all absorbed in preparing for the impending struggle on the Rhine frontier, until a few years since, totally neglected the mobile defence of her Alpine boundary, perhaps thinking she had been sufficiently provident in fortifying all her principal valleys with redoubts. Thus, in a brief space of time, the Italians had placed themselves on a par with Austria as regard mountain defence and above France. But now, alas! this happy state of things has changed, and especially in so far as France is concerned. Austria-Hungary has of late years greatly improved and increased her mountain troops. The Imperial *Schützen*, entirely recruited, and for the most part garrisoned, in the Tyrol, has been raised from 10 to 12 battalions, while to these must be added 10 battalions of *Landesschützen*, excellently organised and exercised, and forming the Tyrolese Alpine Militia. So in the mountain wedge thrust menacingly between her Lombard and Venetian provinces, Italy sees 22 battalions of Alpine troops, to be backed eventually by the *Landsturm*, formidable in number, well organised, and fired by a rich patrimony of glorious traditions; the *Landsturm*, in short, of Andreas Hofer. In Pusteria, Carinthia, and Carniola, there are other bodies of troops trained and inured to mountain warfare, and behind them numerous regiments of infantry who, owing to the system of territorial recruiting in vogue in the Austro-Hungarian empire, can be complete and ready at the frontier within a week of the first day of mobilization. It is true there are but few mountain batteries in the Tyrol at the present moment; but this is only because the greater part have been sent to Bosnia and Herzegovina, whence they would be speedily recalled should the good understanding now existing between Italy and Austria undergo a change. But if in a war with Austria, Italy would start at disadvantage, still more so would this be the case in a conflict with her neighbour on the west. Her efforts at the fortification of her mountain frontiers have spurred France to a flattering rivalry, which has been further intensified by the strained relations of late existent between the two countries. Nice and Briançon have been turned into powerful bases of offensive and defensive operations, the guns of French forts virtually command Italian territory, thereby making offensive operations on the part of the latter more difficult, and numerous bodies of troops formed on the Italian model are permanently lodged on the frontier. These consist of twelve Alpine groups, each comprising a battalion of six companies of chasseurs, a mountain battery of six guns, a detachment of engineers, and accessory services, in all 9,600 rifles, with 72 guns, on the peace, and 18,000 rifles with 72 guns on the war footing. Furthermore it is rumoured that France is about to double or even treble her Alpine forces. Add to this, that the French system of mobilization allows of all the different war units being completed within the briefest space of time, that she has plentiful railway communication almost up to the very watershed; and that

consequently Italy, but partially prepared, would within a week of the outbreak of war find herself confronted by vastly superior forces. It should further be remarked in connection with it, that the southern slope of the Alps being steeper and consequently less habitable than the northern, Italy is subjected to the further disadvantage in Alpine warfare of having, as compared with her neighbours, a less numerous population inured from birth to the life and hardships of the mountains."

The subject of this article is a translation from the "*Journal des Sciences Militaires*" of a paper written by an officer of the French Alpine columns. It should be interesting to us in India at the present time, especially when we bear in mind that notwithstanding its importance, we have not, with the exception of Shadwell's Review of the Campaign in Switzerland in 1799, any text-book on the proper mode of conduct of mountain warfare. It is a subject of regret that no translation in our language has ever been made of Von Kuhn's "*Gebirgs-Krieg*," the best work on mountain warfare.

The contributor is not prepared to endorse all Colonel Paquie's statements herein.

I.—MARCHES.

Formation.—Marches in mountainous countries are characterised by a great simplicity of formation; troops, both men and animals, can only move on the paths and tracks of the Alps in single file.

Maximum effective of a marching column.—The distances lost on the line of march on level ground are well known; the lengthening out is much greater in the mountains, and varies directly with the slope and obstacles of the paths, so much so that it is hardly possible to lay down any proportion. The main body of the column of an Alpine "group", consisting of 3 companies of 150 men each, and the fighting line of a mountain battery occupies on the march a depth of 1,300 yards, and at the hourly halts it takes eight minutes for the last files to close up. In order to give these rear files a few minutes rest the duration of these halts must therefore be almost a quarter of an hour. On the other hand, should these rests exceed 15 minutes per hour, the time of march will be unduly prolonged, the troops will arrive in camp very late, and the meal times both of men and animals will be interfered with. It follows then that the Alpine group on a war footing is represented by the maximum effective strength that can be moved in the Alps without being sub-divided. The present group of one battalion, one battery, and a small detachment of engineers, is quite large enough.

Echelon of Marching Columns.—A larger body than the above must be sub-divided, and the different parts echeloned at a sufficient distance from one another to ensure a complete independence of movement to each. If this be not done, the short stoppages, the losses of distance, which pass from the head to the tail of the column, and which increase progressively, and not proportionally to the size of it, would create such difficulties and confusion, that a long column of a regiment

(three battalions) for instance, would soon become confused and disordered, and would be unwieldy on account of its size. A regiment marching on a single path should be echeloned by battalions, each marching on its own account and forming a separate column, but the intervals between these battalions should be greater than in ordinary marching.

On a road the independence of battalions marching in fours is assured by allowing an interval of about 100 yards between each, which is more than the distance lost by one in marching; if a man falls out, or an accident happens to an animal or a carriage, they are drawn on one side, and the movement of the column is not practically interfered with. In the mountains on the contrary, a mule which lies down or jibs, or whose load slips, bars the path and stops everything in rear of it; thus great gaps in the column are produced, and it soon becomes sub-divided into a large number of fractions. To re-establish order and cohesion, the head of the column, in addition to the hourly rests, is often obliged to make halts which are longer and more frequent, the less the men and animals are trained and the larger the size of the column.

It is evident from the above, that the intervals between battalions marching on the same path must be greatly increased: the maximum interval is determined by the following considerations:—

If the distance between the various marching bodies were too great, each of them to ensure its own safety would have to throw out an advanced guard. Again, the duties of the flanking parties, which for service in the mountains require more attention than elsewhere, are extremely severe and harassing; it is logical therefore, in order not to submit the men to excessive fatigues, to move the rear of the column under the protection of positions taken up by the flanking parties of the head.

In fixing the departure of the battalions at one hour apart, it appears that the varying considerations just mentioned are to a great extent complied with.

The normal order of march of an Alpine group.—It is not necessary to modify in mountainous countries the normal order of march as prescribed by regulation, in so far at least as the proportion of the various fractions is concerned. The advanced guard of an Alpine group consists of one company (150 rifles), of which one section forms the vanguard. The engineer detachment with its dynamite mule, the flanking parties, and the mule carrying the company entrenching tools, march at the head of the main body of the advanced guard.

The main body of the column consists of 3 companies, less one section forming rear guard, and the fighting line of a mountain battery introduced between the two leading companies. Entrenching tool mules march in rear of their respective companies, and all the other animals in the following order:—

Ammunition boxes, artillery and infantry; medical and veterinary stores; cacolets, provisions and baggage; spare mules and led horses.

Finally the rear guard, consisting of a section of the last company.

But if there is no reason for modifying the composition of the different fractions, there is for altering the distances which should separate them.

In Alpine paths, steps have to be retraced frequently, often indeed the advanced guard has to march by a very roundabout way. To fulfil their duty without unduly delaying the march of the column, the advanced guard should start at least one hour before the main body; the hour of its departure depends also on the probable work it will have to perform.

The protection of the flanks also invites particular attention: the flanking parties must take up their positions before the passage of the column.

The movements they have to make being long and laborious, it is necessary that they should precede the main body by some distance, in order effectively to fulfil their rôle.

Again, on ordinary ground, an advanced guard preceding a small column by 1,300 to 1,600 yards protects it to a great extent from the long range fire of infantry; in the mountains a distance of 1,600 yards, following the contours of the ground or the zigzag of a path, would correspond to a much shorter distance measured as the crow flies, and would be absolutely insufficient to protect the column from surprise. This consideration, in default of any other, should hasten the departure of the advanced guard.

As to the pack animals, they should march immediately behind the column, and start at the same time with it; the delay caused by accidents *en route* will always delay them, and it will be often necessary to prolong hourly halts, in order that they may not be left too far behind and thus in danger. In any case it is always easy to wait for them, but it is not easy for them to catch up a column; consequently their departure should not be delayed.

Briefly, the modifications of the usual service distances consist in dilation of the head, and compression of the rear, of the formation.

Places of officers in a column.—In the mountains officers cannot march conveniently on the right or left of their command. They are, so to speak, chained like every one else to their place in the file, and in order to be able to exercise an effective supervision on the march, this place should be at the rear of the fraction placed under orders. There are two exceptions to this rule: the proper place of the commander of the column and of the advanced guard is at the head of the main body of the column, and the main body of the advanced guard respectively, in order that they may be able to move to the front directly the enemy is signalled, to reconnoitre the ground and make dispositions according to the circumstances of the case.

Places of the leaders of animals.—To avoid accidents, the losses of stores and animals, and the delays caused thereby, muleteers should always walk on the side of their animal nearest the precipice. This precaution is often forgotten when the zigzags of the path are very short, and the dangerous side is thus alternately right and left; and it is precisely under these circumstances that accidents are most frequent, and

they are more serious in that the animals roll across the zigzags already occupied by men and animals, who are thus in danger of being swept away. At the hourly halts muleteers should rest beside their animals; the neglect of this rule has sometimes caused unexpected accidents on good mule paths.

Regulation allows but one muleteer to two baggage or provision mules; this is not practicable in the mountains, and has never been adhered to in the 6th Alpine group on account of the evident danger which it presents. To retain a few bayonets in the ranks, the loss of provisions, of baggage, and of animals is risked; the advantage is not commensurate.

The mules which incur the greatest risks are no doubt the gun, and carriage mules of the mountain battery; their heavy load of 231 lbs., instead of being divided on the sides, is raised above the spine of the animal, and is in unstable equilibrium. In difficult and dangerous places, especially in descents, it is convenient to fix a rope to the rear arch of the saddle, which being manned by the gunners in rear, prevents or eases falls, and keeps the animal on the path instead of rolling into the depths below. The "penny-a-liners" of our press describe the Italian Alpine troops as passing their animals over precipices by means of ropes; these exploits resolve themselves into the above prudential measure, which practice in mountain marching naturally suggests.

Pace.—The tracks and even the good mule roads are not mile-stoned; distances in the mountains are measured by hours, by lengths of time; it is very difficult under these circumstances to form a correct idea of the speed of a march in miles. On ordinary roads, the head of the column can move at an uniform speed; a well regulated pace is one of the essential conditions of good marching; in the mountains the pace is subordinate, not only to the difficulties of the path, but also to the state of fatigue both of men and animals. In the sharp morning air with fresh troops the pace may be accelerated, and should be slowed down as the march gets longer and the heat of the day and fatigue begin to be felt; the uniform rate of marching, which is perfection in the plains, is not to be striven after, and indeed could not be obtained in the hills on account of the great variety of obstacles and slopes.

The speed of a column depends above all on the degree of training to which the men and animals have been brought, particularly in the artillery. It will not do to await the declaration of war before exercising troops in mountain warfare; it is absolutely necessary that they should have a previous experience of this rough life, under no less a penalty than the most serious disasters, as the following example will show:—

The mountain battery of the 6th Alpine group having embarked for Tonkin, was replaced last summer (1886) by a new battery, hurriedly raised which arrived, at Saint Sauveur-à-Roure two days before the 30-days manœuvres. The staff, the men, and the animals were quite new to Alpine work; the mules were loaded for the first time the day before setting out from that station.

The two pack animals of the sapper detachment were alike in the same unfavourable conditions.

The first march was neither long nor laborious; but it began with the ascent of the mountain of Saint-Sauveur-à-Roure, which is very steep. The advanced guard had hardly started a quarter of an hour, when the dynamite mule opened the ball by rolling into a ravine. Its rescue delayed the advanced guard half an hour, and it was almost useless for about 15 days. It is unnecessary to enumerate all the misfortunes of the battery; from the first halt the animals were breathless and exhausted; the gun and carriage mules in particular could not keep up, and were continually throwing themselves down or rolling down the slopes. The 6th Alpine group took nine hours to accomplish the short journey to Saint-Sauveur-à-Bénil, a march that trained troops could easily make in four hours and a half.

An engineer mule disabled, one mule dead—the result of a fall into a deep ravine, and a third of the animals of the battery unfit for service, was the casualty return of the first day. One can guess what the result would have been had the march been a long one, and the ammunition boxes loaded with their war equipment instead of a few blank cartridges. After this, the battery was only able to turn out one gun per section for the manœuvres round the cantonment, which lasted three or four days. During this time the animals rested, and received the care and attention they required.

At the end of a month of gradually increasing work the mules recovered, and were in good training; the staff and the men more experienced, and this battery was able to make a forced march of 19 hours without incurring a single serious mishap, and to keep up with the infantry, and even passed over the ground where it got into such difficulties on the first day.

The least check experienced at the commencement of hostilities, exercises a disastrous moral influence which must be avoided at any cost; again, in mountainous countries above all others, war is made with the legs, and the first success will incontestably fall to the side which has in time of peace devoted most time to the training of its troops. When one is convinced of this truth, it is a pleasure to undergo the exceptional exertions of mountain marching; the longer and rougher the journey, the greater the satisfaction felt on reaching the evening camp, and whoever ceases to feel this satisfaction is unfit for mountain service.

It must not be concluded from the above that the best method of preparing troops for mountain warfare is to submit them to excessive work under the pretext of training them. A system of exhaustion is to be avoided. A rational gradual training develops the physique of the men and animals, and preserves them in health and efficiency, whereas excessive fatigue and exhaustion fill the hospitals, disgusts every one, and engenders breaches of discipline.

Finally, troops trained for mountain warfare will find all other services come easily to them, whereas those that have never quitted the plains will find themselves quite out of their element in the hills.

The conclusion is self-evident: troops intended for Alpine warfare should be constantly manœuvred in the mountains.

Difference in duration of journey in going and returning between two places.

It is a general belief that a march is more rapid down than up hill; and consequently that the time it takes to go and return between two points situated at different altitudes varies with the steepness of the slope. This is true for unloaded men, for tourists who reserve their energies for the ascents, and can without inconvenience quicken the pace or even run down hill. Under these conditions about 15 minutes per hour is gained at the descents; but this gain decreases considerably with laden men, and almost disappears when the column is composed of infantry and artillery.

At the ascents the men retard the animals, the muleteers as much as the infantry; the inverse occurs at the descents, where the artillery delays the infantry; so that the time taken to go and to return between two points at different altitudes, and a sufficient distance from one another, is almost the same either way.

It is erroneous to think that laden men experience more fatigue in ascending than in descending slopes. In spite of so called scientific theories, in spite of appearances, one must judge by the evidence, that is, by the statements of the men themselves, eighty out of a hundred of whom declare that the descents are more laborious than ascents. I am speaking, be it understood, of the steepest slopes of the mountain, where an ascent or descent of 1,000 feet per hour is made; a column then is badly led, when the pace is quickened at these descents under the leadership of unladen officers.

Marches on the snow.—There is little to be said on the subject of marching in the snow. Alpine battalions occupy their sections of country towards the end of the month of May, after the melting of the snow and no glaciers exist in that part of the Maritime Alps that we have explored. Nevertheless in 1885 during the first few days of June, the 3rd company of the 7th battalion of chasseurs in cantonments at Pra in the Haute-tinée, made reconnaissances of the Pas de la Cavale and of the Col de l'ourrial across the vast plateaus of Salzo Marino, still covered with snow to a depth of about eight feet. In the morning the snow, hardened by the cold of the night, bore the men well, and the march was pretty quick. But on the return journey, the surface, thawed by the sun, was no longer so firm, and the men sank in up to their knees; it would have been very difficult if not impossible for them to get back to cantonments, had they not been supplied with snow shoes. These snow shoes or racquets are oval in shape, 14" long and 8" broad, the frame is of wood resting on the ground and filled in with longitudinal and transverse strings, forming a net work with interstices of about one inch square. These are fixed to the feet by small cords round the shoe and leg, and the men can thus march on the melting snow and drifts, without sinking in more than three inches. When these are carried, the men should be provided with balls of string for the repair of the web, which soon becomes worn by contact with the ice crystals; on newly fallen snow the shoes will wear longer. It is possible in the winter to march without snow shoes; the leading files will certainly

have very hard work in beating out the track, and ought to be relieved, but the rest of the detachment will be able to follow easily.

The dangers of mountain travelling in the winter are not confined to the risk the pedestrians run of sinking into the snow; but they can also be overtaken by bad weather, when the snow which falls, and that which is whirled up by the storm, causes a complete darkness. The blinded travellers, losing their direction and unable to recognise the path, are reduced to a fatal inaction, and their bodies are found under the newly fallen or drifted snow, and not on the bottom of a track which they must have beaten with their feet.

When our credulous newspapers describe the Italian Alpine companies as executing long successive marches in the mountains during the winter by the aid of snow shoes, and see in these imaginary exercises a means of invasion of our higher valleys, even in the depth of winter, their stories are a source of amusement to all our mountaineers. The Italian Alpine troops, like our own, pass the winter in the lower valleys, and it is not until the month of July when the ranges are practicable, that they advance to the frontier, where they may be seen every year, but later than our troops.

Our Alpine troops are as good as those of Italy, but the latter are comparatively in great numerical superiority; our Alpine groups are scattered along the frontier, the extent of their sections being much too great. What can be expected from a small battalion called upon at the outbreak of hostilities to guard with its peace establishment a section of frontier some 50 or 60 miles long!

Even if it were doubled by the addition of one of the first battalions mobilised, the task would still be beyond its capacity. This situation requires a prompt remedy; the Italians are able to oppose almost a whole Alpine regiment to each of our battalions.

Night marches.—Night marches in the mountains are very fatiguing and perilous; if an accident happens, the immediate rescue of the animals that have gone down the slope must be renounced, and they and their loads must be either abandoned, or a sufficient number of men must be left behind till day-break to effect what is sometimes a difficult operation.

But on service there is no choice about the hour of departure; the exigencies of war, such as the approach of the enemy, the necessity of being at a given point by a given time, to effect concentrations at a pre-arranged moment, necessitate a start at any hour. To be prepared for any eventuality in time of war, Alpine troops ought to be exercised in time of peace in night marching in the mountains, and the Alpine battalions very rightly inaugurated last summer these indispensable operations.

Before setting out, all animals should be rigidly examined to see that they are properly saddled and their loads properly packed. Whatever may be the urgency, the start should not be hurried; a hasty muster, while gaining a few minutes, will eventually cause the loss of hours by reason of the accidents that will occur *en route*. Troops should never move by night in the mountains without first procuring a number

of torches or lanterns, which need not be lighted until required. This precaution is indispensable even on a clear night, for one may be surprised by a storm, as on two different occasions happened to the 6th Alpine group. The first time, thanks to the lanterns which the companies and the battery had borrowed from the inhabitants of the cantonment to which the party was to return, the march was not interrupted, in spite of the darkness and the rain. The second time the force was changing its cantonment, and making a forced march which had to be prolonged into the night; and the companies only possessed their signalling lantern. The column left Guillaumes in the valley of the Var at 3-30 A.M., and arrived at the valley of Blore, situated between La Tinie and La Vesubie, at 10 P.M. Here it was overtaken by a violent storm. The darkness was so profound that the column was obliged to halt, and would have been obliged to spend the night on the road, if the regimental march sounded several times on all the trumpets had not been heard by the company of the advanced guard, who returned to the main body with all the lanterns and torches that they could procure in the village of Saint-Dalmar-le-Plan, where the men and animals could take shelter after a march of 19 hours broken by two long halts, the first of one hour, and the second of three hours.

The following morning no one failed to appear at roll call, and the 6th group occupied the Col de Saint Martin and the Col de Colmaine, where it had to await the arrival of the enemy, such being the object of the forced march of the previous day. In the night marches made by the 6th Alpine group by good luck no serious accident occurred; they had been preceded it is true by short preparatory marches, made at first along good mule paths, and afterwards on longer and more difficult tracks; like the day marching the training was gradual. It must be remembered that the feeling and consciousness of danger and the disagreeable prospect of having to pass the night out on the hill side in case of accident, kept the muleteers on the alert and prevented carelessness. One is induced to believe that animals see better than men at night, for they rarely make a false step, and easily follow the path that their rider cannot see. From the above facts it may be deduced, that if night marches should be avoided as much as possible, they may be resorted to, if need be, even on the bad roads of a mountain.

Remarks.—If mountain marching taxes the legs and lungs severely, it is at least free from many drawbacks: the way is often stony and steep, but it is free from mud and dust, the men breathe the purest air, and the variety and beauty of the views, which one can never cease to admire, make the time pass quicker than on the monotonous roads in the plains. There is moreover the more direct and very remarkable advantage, that galls on the feet are rare and the number of footsore is reduced. Again, carriage in the cacolets, when one of the two men is often poised above an abyss, presents no attractions, and it is only as a last resource, when really exhausted, that men fall out and consent to occupy these really dangerous seats, which are generally empty or at most filled with packs. As the more comfortable method of transport as used on the high roads of the plain is not to be reckoned on, no

stragglers are left on mountain paths. This good habit once acquired of necessity, still obtains when the troops descend to the lower valleys, for the idlers would be ashamed to fall out on a good road when they can keep up on a bad one.

Alpine manœuvres are therefore an excellent school, and the more that school is made common, the more we increase our chance of success in mountain or other warfare.

II.—CANTONMENTS.

It has been truly said that the worst cantonment is better than the best bivouac, as far as the rest of the men and animals, and their health, are concerned, on which their state of efficiency, that is the real sinews of war, depends.

This truism is more evident in the mountain, where the nights are always cold even in summer.

The resources offered by the villages and hamlets of the upper valleys of the Alps for the quartering of troops vary with the time of year. At the end of spring the herds are led out to the higher pastures, the village stables are empty, last year's stores of forage are to a great extent expended, the granaries and barns are almost empty. The greater number of the inhabitants also live in the summer in the barns near the pastures where their herds are, and their homesteads being thus available during the fine weather, the villages can put up a much larger force than those of the same size in the plains.

During the winter, the herds having come down from the higher mountains, fill up the stables, the barns are overflowing with forage, the houses of the inhabitants are no longer empty, consequently the means for quartering troops are very restricted, especially for the animals. It is true that in war time this state of affairs would soon be remedied; all local supplies would be quickly absorbed, and no doubt the herds would be immediately driven within the hills for the provision of the troops, and to save them from falling into the hands of the enemy.

III.—RIFLE FIRE IN THE MOUNTAINS.

Before the experimental firing executed by the Alpine battalions, it was taught that the range obtained from a certain sighting increased in shooting down hill according as the angle of depression of the slope became greater. It was even said, that to hit a mark placed below the horizon, it was sufficient to take a sight equal to the horizontal distance between the firing point and the object. In up hill firing, it was believed that the range obtained by the same angle of elevation decreased as the slope of the hill increased.

As far as depression firing is concerned, these views were at least in accord with the theory of the movement of a projectile *in vacuo*; but for firing up hill the supposition was no longer based on this theory; for with equal angles of elevation, ranges *in vacuo* are equal to, less, or greater than, the horizontal range, according to the quadrant elevation. As the variations in range in uphill firing do not form part of the course of elementary firing, it will be useful to state them. In describing with the line of sight a quarter of a circle above the horizon, the range

obtained on the various positions of this line with a constant angle of elevation (*i. e.* a fixed sight) is at first less than the horizontal range; continues to diminish, attains a minimum, then increases, and becomes equal to the horizontal range, exceeds it, attains a maximum, diminishes, becomes equal to the horizontal range, and diminishing progressively, becomes nil when the line of fire is vertical.

The question was to see if these variations of range *in vacuo* would be reproduced on a smaller scale in the air.

Some officers stated that besides the variations in range arising from the inclination of the line of sight, the accuracy of the fire would suffer from refraction, which would cause an illusion as to the real position of the target whether seen from above or below; and they further stated that a sight fixed in the morning under these conditions, would not give the same results at midday, not so much on account of the difference in temperature, but on account of the variation in refraction.

We assert nothing; these conjectures were obtained in the schools of musketry, and were apparent in the commission charged with the preparation of the instructional musketry regulations.

Light Targets.—The light equipment adopted by the 7th battalion of Chasseurs for experimental purposes consisted of skirmishing targets 2 ft. 6 in. high by 1 ft. 6 in. broad, and of larger targets (*panneau*) 6 ft. 6 in. long by 2 ft. 6 in. high. These targets were made of light cloth, and were supported by two iron rods, the lower ends of which fitted into wooden pickets. These pickets, 10 in. long and weighing 10½ oz., had on the top an iron socket, and an iron point on the bottom, so that they could be used on hard ground. Each picket had a hole 4 in. deep in the head for the reception of the rods. These rods were 39 inches long and ¼ of an inch in diameter, each weighing 9 ozs; they ran along seams at the ends of the cloth in the small targets, and at the two ends and centre in the larger targets. Each company had a set of five small and two larger targets, with three spare rods and three spare pickets. The whole weight is 26 lbs. and is easily carried during manœuvres by allotting the cloth, the rods, and the pickets to different men. Their loads are not sensibly increased, since the whole weight of 26 lbs. is sub-divided into 46 parts, of which the heaviest weighs 10½ ozs.

To carry out the various series, the distances were first of all judged by sound, an officer close to the targets ordering the markers to fire several volleys of blank; then several trial volleys were fired, the results being signalled by the markers. When the range had thus been accurately determined, each man fired three rounds independently.

In the 2nd series the firing was in the opposite direction, the targets being placed at the original firing point, and the marksmen going to the place formerly occupied by the targets. The range was decided in the same manner by observers placed near the targets, who did not know how their signalling affected the sighting. Many trials at distances between 220 and 1,300 yards at inclinations varying from 10 to 40 degrees, gave almost always the same sighting for shooting either way; the differences of sighting which were sometimes required never exceeded 50 yards, and the accuracy of the fire was practically the same

both ways. Often the companies fired four series on the same positions under different conditions of temperature, two in the morning and two in the evening; the sighting was always found to be the same. These experiments allow the following conclusions to be drawn :—

1st. All the former theories on fire in mountainous countries were false, in so far as the influence of the inclination of the line of sight on the range was concerned.

2nd. Variations of 1° to 10° of temperature in the same day do not appreciably alter the position of the groups of hits (*i. e.* the probable rectangle). The correct sighting for the morning gives correct results in the afternoon, whatever may be the quadrant angle between 0° and 4° , and within a range of 1,200 yards.

3rd. The influence of refraction is purely imaginary, even in the deepest valleys.

To sum up, the trajectory and the angle of elevation may be considered invariably to have the same relation to one another, be the shooting up or down, right or left, the trajectory conforming to all these movements of the sights, and preserving in each position the same relative position to the angle of elevation, provided always that the latter remains in the plane of fire, that is, that the backsight is perpendicular. These axioms once acquired, the light targets enabled the companies not only to have target practice, but to execute field firing both offensive and defensive, a most valuable instruction for both officers and men.

The field firing with ball cartridge on varied grounds is of most undoubted value, were it only to teach the men not to shoot one another in battle, as occurred in times before the enemy, and they were still lacking in practice.

It is true that favourable ranges in the neighbourhood of garrisons are rare, especially when they are not sought after; and when they do exist, they are generally on barren ground, cut up, and without good means of access. The transport therefore of the heavy targets of the ranges, which are really not applicable for this instruction, is unpopular and tedious. Regiments can avoid this difficulty by providing at small cost, from the school funds, a light equipment like that which has been described above.

IV.—STUDY OF THE MORE HILLY POSITIONS IN MOUNTAINS (ALPS).

The higher valleys of the Alps are very narrow; their sides, like their crests, are often impracticable; mountainous countries are not suited for the deployment of large bodies. Again, mountainous countries barely produce sufficient food for their inhabitants, and to provide for the feeding of the troops, fixed or moveable depôts have to be formed by the aid of well organized convoys, except in the case of meat, which is generally found on the spot in sufficient quantities. The higher valleys of the Alps can then only be the scene of secondary operations.

Even when important operations take place, in most mountainous countries, as in Switzerland in 1799, the decisive actions necessarily take place in the lower valleys intersected by a great number of lines of communication, and the higher positions are held by weak detachments. We

will study the defence and the attack of these higher positions, taking as a type the action of a complete Alpine group, that is, one of the largest engagements that can take place there. We shall lay great stress on the methods of taking every advantage of the ground for the combined fire-action of infantry and artillery.

The sides of Alpine valleys have generally the following configuration. Quite close to the watercourse is a steep slope or precipitous scarp, in which the principal road of the valley is cut, above this is a more gentle slope, more or less broken and intersected with ravines, on which are the cultivated grounds, the homesteads, barns, hamlets, and villages; the larger inhabited places are however generally built on the banks of the stream at places where the valley widens out. The gentle slope is bounded on its upper side by a curtain of rocks terminating in the crest.

The crest is generally impracticable, but sometimes presents rounded summits or terminates in high plateau covered with pasture, and can easily be traversed, although paths do not exist on it.

V.—DEFENCE.

The defensive positions of a mountain tract lie in the valleys, and on the roads of communication from one valley to another. In the first case a position is taken up either facing the upper end of the valley or towards its mouth, and on flank positions running parallel to the watercourse.

On the roads which unite two valleys, the positions are generally astride of the road either on the saddle or the ascent or descent from it; their front is generally very narrow, and the flanks often rest on obstacles impassable at least within tactical limits.

Large, open, and unbroken fields of fire do not exist along the front; the approaches of the positions are cut up, irregular, and strewn with obstacles; the defence will rarely have occasion for long range fire; ranges exceeding 1,600 yards are quite exceptional.

The interior of the positions offers excellent shelter for supports and reserves, but intercommunication is not always easy.

The rear of the position offers good rallying points, but generally only one line of retreat, or practicable path, especially towards the saddles.

Although all classical conditions are not fulfilled, thanks to the protection of the flanks and the difficulties of employment and movement that meet the attack, mountain positions may be deemed unassailable in front, if they are properly occupied.

Effective zone of infantry fire against artillery.—To determine the most advantageous method of posting the troops, the action of infantry against artillery must first be examined. The action of unaided artillery against artillery can only be a very rare event in warfare; it is not in view of this possibility that we examine the situation, but it is impossible to overlook it in studying the whole question. The action of infantry against artillery exhibits two essentially distinct phases. The first extends from the limits of effective artillery fire to the limit of effective infantry fire; this phase of the action is a very critical one for the infantry, as they are wanting in all means of defence. The second phase commences

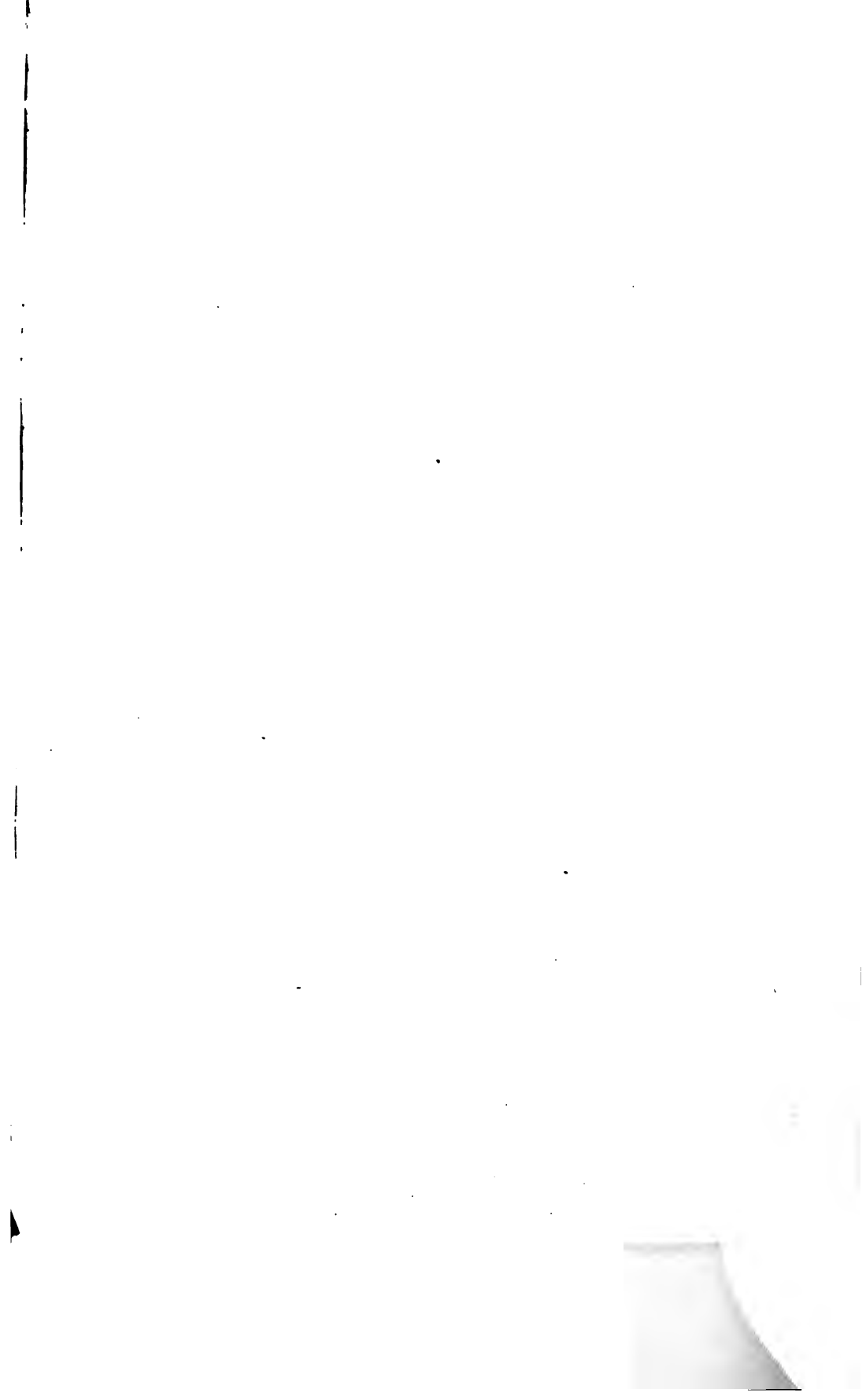


Fig.1.

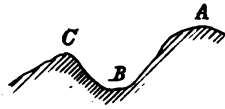


Fig.2.

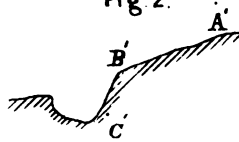


Fig.3.

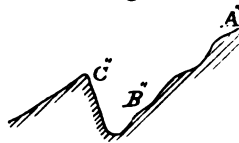
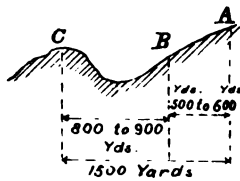


Fig.4.



when the artillery comes within the effective zone of the rifle fire; the guns then lose all their advantages, and cannot avoid being reduced to silence. It is necessary then to fix the limit of effective rifle, fire to distinguish between these two phases.

There is a tendency among infantry to exaggerate the extent of the effective zone of their fire, and on the other hand, gunners depreciate it; we allude to the conflicting experiments made on the one side at Châlons, and on the other at Bourges.

Now-a-days the difference has been split, and regulation very rightly lays down that batteries run great risk at 1,300 yards, and can no longer hold their own at 800 yards. These numbers must be remembered, as they form the basis of our argument.

Usual profiles of the approaches of a position.—On the slopes the approaches of positions are most often found by the two sides of a ravine, and the range is represented in action by the profile A. B. C. (Fig. 1).

The commanding position A. generally faces towards the mouth of the valley, and dominated point C. towards the head, but numerous exceptions exist.

The approaches of a position are sometimes on a single slope, and their profile takes the form A.' B.' C.' (Fig. 2).

In front of the saddles and at the saddles themselves, the approaches with a downward slope end in a more abrupt slope B.' C.', as in the preceding case, or by a hollowing out of the ground parallel to the front of the position.

In rear of the saddles the approaches of the position are commanding, and present the inverse profile C." B." A." (Fig. 3).

Occupation of positions.—In front of positions ranges of varied extent may be found; those exceeding 1,600 yards are, as we have said before, rare, and the defence will be very lucky if they can sweep with their fire the ground up to distance of 1,100 yards.

As an example let us take a range A. B. C. of 1,500 yards. (Fig. 4). Having settled on the best method of occupying the position, we will investigate the necessary modifications for a longer or shorter range, and then we shall have studied all sides of the question.

The natural position for the mountain battery of an Alpine group will be at the culminating point A.

The firing line of the infantry should be pushed far enough to the front to protect the artillery from the effective fire of the enemy's infantry; to secure this, the line will be at B. some 500 to 600 yards in front of the guns. It is true that in this position it will only command a field of fire some 800 to 900 yards in depth; but its position will enable it to annihilate the action of the artillery of the attack, which will be under the necessity of entering the effective zone of the infantry fire of the defence, and will be quickly destroyed.

At first sight it appears disadvantageous to sacrifice 500 to 600 yards of a possible infantry range of 1,500 yards, but on examining the tactical problem more closely, it will be found on the contrary that the defence derives its principal strength from this advanced position of the fighting line.

The infantry of the defence cannot fire more than 800 to 900 yards ; and the longer ranges are certainly lost to them, but this is not to be deplored, because the lost ranges are not very effective. The infantry completely protects the guns, and will promptly subdue the fire of the attacking artillery, which will endeavour to come into action at 800 to 900 yards from the line, without taking into account the help of the artillery of the defence, whose shooting ought to be as good as when at practice, for the battery will be so to speak out of harm's way, and that without even having to construct epaulments.

Such are the great advantages which this method of occupation secures. We will now show that they will tend to disappear and even to pass to the side of the attack, in proportion as the infantry of the defence, under the idea of getting a longer range, is withdrawn towards position of the battery.

Let us take the case that the line is established close to the guns, not side by side as is sometimes seen, but 100, 150, or 200 yards in front. In this case the infantry could open fire at 1,200 to 1,300 yards, and would then get an extra 500 yards of range which its former advanced position prohibited. Well ! with due deference to the partisans of long range firing, the defence to our mind will commit an immense mistake including four cardinal faults:—

1st.—The attacking artillery which could not act at 800 yards from the infantry line, could perfectly well come into action at 1,300 yards, and take its part in the attack.

2nd.—Covered by their guns, of whose protection they were deprived in the former position, the infantry of the attack will easily advance to within 600 yards of the line of the infantry of the defence, and then it will be agreed that the guns, placed 100, 150, or 200 yards in rear of that line, will find themselves very awkwardly situated, within the most effective zone of the enemy's rifle fire, a position which they cannot maintain.

3rd.—The distance of 100 to 150 yards between the artillery and infantry being less than the depth of the "probable rectangle" of the enemy's rifle fire, the gunners are liable to receive shots aimed at the infantry and *vice versa*, thus all the fire of the attack has a double target.

4th.—The projectiles which pass over the crest will disturb, if not hit, the reserves placed behind it.

The musketry regulations rightly say "that every position which involves the guns being placed too close to the infantry line, while the enemy's batteries can fight from their normal position, is defective or badly chosen."

The preceding discussion allows us to determine the meaning of this last sentence ; by "normal position" must be understood a position at some 500 to 600 yards in rear of the infantry line. The guns begin to get too close when this distance is 400 yards, consequently any position which does not permit of a range of at least 1,000 yards, does

not lend itself to the combined action of the two arms, and is suitable for infantry only.

Now let us study the exceptional ranges of more than 1,600 yards. To do this let us turn again to the position A. B. C. of 1,500 yards, and put the following question :—

The battery being placed at A. and the fighting line of infantry at B., would it be preferable to have a range of B. C. of 1,900 yards, instead of one like B. C. of 800 to 900 yards? (Fig. 5).

Undoubtedly no, because the hostile artillery, which could not establish itself at C. within the effective zone of an infantry fire, would recover all its advantages at C. beyond rifle range.

Is it that the position A. B. C. is defective, and does not lend itself to a good defence? Certainly not; but it requires a different disposition. It is not by placing the artillery at A. and the infantry at B., that the utmost advantage will be taken of the ground against an enemy provided with artillery. The infantry fighting line of the defence should be placed at B. at 800, 900 or 1,000 yards from C.; this as will be seen is a large margin; it is sufficient in choosing a good position that the ground at C. shall be effectively swept by infantry fire; and this is the great point to be sought after, even if B. be dominated. The guns of the defence will be placed at A. at their normal position in rear of the infantry. The upper position A. offers a second line of resistance, undoubtedly less strong than the first, because it will be exposed to the fire of the hostile artillery.

Dispositions against an enemy unprovided with artillery.—If the enemy be unprovided with artillery, and so the defence from information received is certain only to encounter infantry, it is quite manifest that there will be no reason for reducing the ranges. In this case the longest ranges will be the best, always understood that the fighting line of infantry shall be about B. 500 to 600 yards in front of the guns placed at A.

The same observation applies to the combat of infantry with an enemy also without artillery; the fighting line should be placed near the culminating point, and not 500 to 600 yards in front of it. Not having any guns to protect, the infantry can take advantage of the total length of the range, taking care always, unless there is a sharp slope, that they are sufficiently high to stop the enemy's bullets and protect the supports and reserves.

Infantry alone against the two arms.—Infantry alone against an enemy provided with artillery, should seek the shortest ranges and reduce them voluntarily, if necessary, in order not to allow the hostile guns to act outside the effective zone of their rifle fire. With a range of less than 1,000 yards, on a defensive position masked from the long range fire of artillery, infantry may except battle and render a good account of the combined arms; the more it seeks to extend the view in order to make use of long range rifle fire, the more its chances of success will diminish.

It may be inferred from this discussion that the defence gains its principal strength from the manner in which the chosen position is

occupied, and that the method of occupation depends upon the composition of the attacking and defending troops.

When the assailant possesses guns, the defender should avoid long ranges or at least reduce them ; when the attack has no guns, the longest ranges are most favourable, but in this case only.

It remains, to conclude this study of local defence, to show the division of the four companies of the Alpine group on the ground, and to indicate briefly the rôle of each one of them in the combat.

The number of rifles to put in line depends on the extent of the front of the position ; one company generally forms the fighting line, another company the support ; the reserve, placed in rear as the rallying position, detaches a company towards the menaced flank, for a good position ought to have at least one of its flanks resting on an obstacle impassable within tactical limits.

The division of the companies depends upon the ground ; manœuvring, preparatory movements, the action of the echelons during the fight, as laid down by regulation, are impossible in the mountains ; each fraction gains the position allotted to it, and establishes itself as well as it can ; everything is a matter of common sense and it is impossible to lay down any rules. It is however preferable to put one company in the firing line with another in support, to mixing two companies to form the fighting line. The advantages derived from the ground depend on the position of the infantry firing line, and it being often difficult to reinforce this position, the line should never quit it to go in pursuit of the enemy, in order that it may be able to cover the counter-attack in case of failure, and re-establish the combat. This position allows also of the counter-attack being executed by the company in support, with the assistance if possible of the company placed on the flank, that is to say, with complete units instead of squads and sections of different companies. If the front of the position is divided by a deep ravine, one company will be placed on each slope.

The great difficulty consists in hitting off the right moment for the counter-attack ; it is best to wait for the retreat of the hostile artillery ; until this happens the moment for passing from defensive to offensive has not arrived ; but if the position is well chosen and well occupied, this result cannot fail to be obtained, and if it is, does not cause the retreat of the infantry also. After a well sustained fire from the firing line, the counter-attack will have a great chance of success. The counter-attack should not press too closely on the enemy, as long as he is within artillery range, in order not to mask the fire of the guns of the defence which will render valuable assistance.

VI.—ATTACK.

A well chosen mountain position cannot be forced in front without a crushing numerical superiority and at enormous sacrifices in men on the part of the assailant, and often the nature of the approaches of the position forbids the deployment of any considerable number, and thus does not permit the attack to take advantage of its numerical superiority.

The assailant is obliged to divide his forces, and attempt to carry the position by concentric attacks.

The problem to be resolved is to arrange for the simultaneous arrival of the different attacking columns on the battle-field, and their departure should be timed according to the journey they have to make; if the calculation of the time to be taken in the marches is faulty, the attack will inevitably collapse, for the different columns will be defeated in detail, for the distance, as well as the impracticable nature of the broken ground which separates them, renders nicety of command impossible; each column commander is left to himself.

The strongest positions are those which have both flanks resting on impassable obstacles, and need not fear concentric attacks; they can only be forced by being turned. As the defence cannot re-inforce all the defiles, it will be easy for the assailant to make a false attack, while the bulk of his force moves against the selected passage.

Before the defender has been able to find out the real object of the assailant, and before he has been able to collect the necessary troops, one of his detachments will have been driven in and the positions occupied in force will be turned. In the mountains as elsewhere, the greatest advantages are on the side of the attack. Looked at from this larger point of view, the attack will be beyond the scope of this study. It will be well finally, to show that the principal power of the attack lies in its initiative, in its liberty of movement, in the boldness of its combinations, and that it ought to seek success rather in the legs of its troops than in the effect of their weapons.

Concluding remarks by Contributor.

Bearing in mind that since the Crimean War and Indian Mutiny, the wars in which our Home and Indian armies have been engaged, have been invariably in mountainous or comparatively roadless countries, and that such is likely to continue, all must view with satisfaction the fact that the United Service Institution of India has set an example in the right direction, by announcing "Mountain Warfare as applied to India" as the subject of next year's Prize Essay. Remembering also that our Home army is so very unlikely to have much experience of continental warfare, that it has so very little instruction in mountain or other rough warfare is inexplicable. Its home establishments moreover in mountain artillery are inadequate, and the localization in India of $\frac{4}{5}$ ths of our British mountain artillery is unpopular, and a mistake for many reasons.

I append a list of foreign works which may not be all generally known, but are among the best foreign works on the subject of mountain warfare.

"Gebirgskrieg" by Von Kuhn. French translation by Weil.

"La Guerre de Montagne," by Garcia.

"La Guerre de Montagne," by Ducuing.

"Les Manœuvres en Pays de Montagne," by Villeméjane.

"Opérations Militaires dans les Alpes et Appenines," by Moris.

"Campaign in the Grisons," by Segar.

"Campaign in Catalonia," by St. Cyr and Suchet.

"Passage of the Alps by Francis I," Gaillard.

"Campaign in the Valtellin," by the Duc de Rohan.

"Carlist Campaign 1873," official.

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**A SUGGESTION FOR THE IMPROVEMENT OF HORSE
BREEDING IN INDIA.**

By Captain S. C. GOUGH, 5th Bengal Cavalry.

So much has been done of late years towards endeavouring to improve the stamp of country-bred horses in India, and so many suggestions have been brought forward as to the class of size best suited to improve the size and bone of the usually weedy country-bred, that there has been undoubtedly a very great improvement in the quality of the Indian horses brought now-a-days to the fairs for sale; and now we see that the interest of civilians is being elicited towards aiding in this important subject, and they are being asked to give all the help in their power towards the breeding of horses in their districts, a help which should very largely assist the government in their object. Thinking over the various improvements in this line, an idea struck me that I should like to bring prominently to notice, as I feel confident that if it was carried out, it would help very materially in improving the stamp of country-bred obtainable throughout India as remounts, not only for native cavalry, but suitable also for British cavalry and Royal Horse Artillery; and go towards supplying remounts for all mounted corps from Indian resources, instead of having to trust entirely to Australia for our horses, besides which a very great advantage would be in having an acclimatized remount accustomed to the very trying climate of India, which, as we all know, imported walers cannot stand, when called upon on service, like the country-breds.

Many stand up for the waler, but all who have had any thing to do with walers on service, have given their opinion in favour of Arabs and country-breds, when it comes to real hard and trying work, bad food, and trying weather; and in case of a large and prolonged war you want remounts handy to the base of operations, and remounts that will train quickly to their work and stand the work, neither of which qualities lies in the waler, and you have to get him from a distance raw and unclimatized. My idea is to get a better class of mare spread through the country from which to breed, the offspring of which would

be bred and born in the country, and more suited for the work of British corps than the country-bred pure and simple, and better fitted in constitution than the foreign waler for the Indian climate. My idea is as follows:—

Annually British cavalry and artillery cast a large number of walers from one cause or another, some on account of being unfitted for further use through hard work or accident, others outstanding their hardships are cast for age at 15 years: these cast horses are sold by public auction several times a year by the commissariat department at all stations throughout India, and knocked down to the highest bidder, nearly always proprietors of cabs or well-to-do natives in the city, who drive them in dilapidated vehicles, sometimes to officers or civilians if in good condition and going fairly sound for hacking and driving, until ultimately they end their days no one knows where or how. By the sale of casters government recoups a certain amount on the original price paid, but to a very small extent as, I think I am right in saying, the horses go for little or nothing, with exceptions of course—selling for any sum from 10 to 80 rupees, say at an average of 50 rupees—but any commissariat officer would be able to give us information on this point.

Among these cast horses are very many mares, and the selling of these mares to the public is in my humble opinion throwing away the very class of dam required in this country from which to obtain a remount fit for British corps in India, the class of mare that should be spread broadcast throughout India instead of being thrown uselessly away for a small sum to no purpose. I think I am right in stating that mares will breed up to 23 years of age, and we all know that many of our best horses in England have been the progeny of old mares, and the one doubtful point is whether a mare that has not previously bred will breed or not late in life: this is a point on which I fear I am unable to give an opinion, and on which veterinary surgeons would be able to inform us, but I believe, now that horses are cast at 15 and not at a more extreme age, that the mares would foal, and the foal of an old mare is as good as that of a young dam, and therefore I hold that the experiment would be well worth trying. Government studs and the keeping of brood mares to foal from were I believe tried, and were done away with years ago, and imported stallions are kept in various parts of the country to serve country-bred mares; but I believe I am right in stating that foreign mares have never been spread in India among the people of the country to establish a better class of country-bred, and one fit to supply British cavalry and horse artillery with remounts. The old studs had this object in view of course, but I believe the trouble and expense was too great, and it was found that the required remount could be obtained as cheap, if not cheaper, direct from Australia; but if imported mares are spread about the country among natives, they will gladly take them with the hope of getting a good price in time for a good foal—and when they find a higher price will be given for the foals of imported mares, they will very soon do their best to get and keep good mares.

My idea is then that—

1. Cast mares be sold for a fixed moderate sum, or for sums fixed by each casting committee for each mare to be cast, to native breeders *only*, the mares to be registered and served by government stallions, and, as at present, government to have first claim on the foal as a three-year old.
2. In the interests of government and of horse breeding, that the mares be *given* to the true native breeder in the breeding districts, and especially among classes from whom we enlist our native cavalry, as these men would take an interest in the breeding, become better horse masters in consequence, and would also profit by the ultimate sale of the foal to government at three or four years of age. The classes I would suggest to whom the mares should be given, would be to our best zemindar castes, namely Sikhs, Jats, and Punjabi Mahomedans.

If the first could be carried out, and the mares sold to the breeders, so much the better for government, and if the price were fixed at as low a figure as possible, the natives might be induced to buy; but as a start and to give breeding a fillip, the best of the cast mares might be given, as I suggest in the second idea, to well-to-do zemindars in the Delhi and Rohtak districts, and to the Sikhs and Panjabis in the Panjab: these three classes are largely country-folk and agriculturists, and would readily I believe accept mares for breeding purposes. It would be best not to meddle with the large country-bred centres as Sonipur, Mukhanpur, Batesar, Shahpur, &c., as their class of remounts are good and useful for native cavalry, and if the waler mares were distributed, it would be as well to give them centres of their own rather than interfere with local class of horse.

The idea seems to me extremely practicable, and I hope that it may be found in some way useful, and a step in the right direction towards getting a better stamp of horse in this country. Bengal cavalry regiments are now obtaining walers from Calcutta at very moderate prices, bought in batches at an average price per horse by the government remount agent there; landed in Lucknow they come to rupees 380, and up country of course the price must be more. Punjab cavalry regiments, however, have little or no chance of getting them, certainly not as cheap. If we started breeding from waler mares, the Punjab would stand a better chance of getting better horses for their service; it would also tend to lessen the price of imported horse-flesh, and above all as I said before, it would give us a better class of horse *at hand* to obtain remounts from, quickly trained, and above all accustomed to the climate of the country.

In my own regiment the last batch of walers are all in weakly condition, and suffering from the heat (June), whereas the Sonipur and Batesar lots of last fair are nearly trained and fit for the ranks. Why? Because the latter are accustomed to the heat and climate, which the produce of waler mares would also be, if reared in India:—last year's walers did their share of work in the winter just as well as the country-breds, but I doubt if they were called upon in the heat, that they would

last. Many have been very bad with bilious fever, which has practically thrown them out of work for a month at least, whereas a country-bred waler, that is out of waler dam by imported sire, would I feel sure keep fit and hard for work even when young and lately purchased, either in the cold weather or hot, the same as an ordinary country-bred ; and be fit to take his place in the ranks in a very much shorter space of time in case of emergency, and, if bred among the classes named, would be close at hand in case of necessity.

[*Note upon the foregoing paper by Major C. GORDON, 6th Bengal Cavalry.*—Needless to say this subject is very interesting, especially at the present time : moreover the writer is correct in his theory that the introduction of foreign mares into India is essential for the successful breeding of horse stock. All attempts to *continue* breeding from the indigenous mare without occasionally introducing foreign blood (mares as well as stallions), must end in failure.

I do not, however, agree with the writer in his proposal to breed from "cast" mares.

It is of course well known that healthy robust mares will continue to breed till over 20 years of age ; but the physical powers of those cast for age from the mounted branches of the services are so enervated and exhausted, that all attempts to breed from them have failed utterly.

Moreover I do not think he is correct, unfortunately, in his surmise that government claims any lien on young stock the produce of government stallions : it would be better if it would.]

SMOKELESS POWDER AS AFFECTING TACTICS.

Translated from the Italian,

By Lieutenant R. A. BROWNE, The Border Regiment.

Introduction.—In the lengthened period of peace through which we are passing, the grievous and unceasing work of preparation for war has brought about such improvements in every branch of military art, as to convince all that the next campaign will differ in many ways from all those which have preceded it.

A multitude of new inventions, new regulations, and new results, to which military studies have led us, and of new and perfected material for war, whether offensive, by land or by sea, still awaits the sanction of experience which only the next war can give.

But the invention which seems above all to impress military opinion, and which will undoubtedly cause, if not an entire, at least a material, change in the development of tactics, is that of smokeless powder; an improvement, which, so far as regards infantry armament, keeps pace with many others in the new small-bore rifle and cartridge.

From the still recent date at which smokeless powder, which we call "ballistite," was finally adopted by the great European powers, pamphlets, newspapers, and reviews of every kind, especially in France and Germany, have discussed it in lengthy and numerous articles, and with an extraordinary dissimilarity of opinion as to its influence on tactics. From the sceptic, who asserts that there is nothing changed in the art of war, and merely a new gunpowder the more, we range to the enthusiast, who dates from its introduction an entirely new era of tactics.

We are still therefore in a period of uncertainty, which cannot be much enlightened even by the trials of smokeless powder which are being made at camps of exercise and grand manœuvres. These do indeed help us to an idea of the changed conditions under which all ranks will find themselves in the fights of the future, and should cause each one of them to consider seriously as to his line of action, according to his rank and command, in new and unexpected contingencies. But only war itself will settle finally what effects the latest improvements in the rifle are to have on tactics; the improvements *i. e.* of powder without smoke, and with a weak report, imparting the maximum ranging power, initial velocity, and penetration, to the bullet.

Notwithstanding this, it is still of advantage to examine what may be the future conditions of battle, to foresee them as far as possible, and to consider their probable influence on the action of both leaders and men on the battlefield. Such is our aim in this essay, while disclaiming any intention of finally solving the questions which may arise from the discussion.

To assert that smokeless powder will cause a complete change in the actual method of fighting seems indeed paradoxical, and we must consider as exaggerated the statement in the *Revue des deux mondes*,* that, "the suppression of smoke marks a new era in tactics;" for the conduct of war, as far as regards strategy, and up to a certain point, organization, cannot be in any way changed by the new powder; and when two opposing armies reach the stage at which tactical action comes into play, it is probable that preceding events will have taught them both the time and place of the coming struggle, and the objectives to be attained therein. But in the pursuit of these objectives, though the fight may, as some contend, be more *mute* than in the past, less visible and audible, and presenting greater obstacles to the execution of details by subordinate commanders, yet this is not sufficient to change it essentially.

No less absurd is it to maintain, with a certain German pamphlet,† that nothing is changed. Who can deny that the special qualities of the new powder introduce a large number of entirely fresh advantages and drawbacks into battle? As it leaves the soldier's view to his front clear, smokeless powder allows of so great a rapidity of telling fire, that if great be the consumption of ammunition, great also will be the results thereof. Further, with smokeless powder we obtain to a hitherto unknown degree initial velocity, low trajectory, ballistic accuracy, and penetration of the projectile; we can always see any movements in our front, or we can watch the ranks of our own men, and we secure a steady delivery of fire. But on the other hand, ambushes and surprises have become easier to carry out, and, as it is impossible to see where the hottest fire is raging, the various alignments and changes of the struggle have become much less apparent. Besides, when we consider that no army or officers have ever yet engaged in actual war under such conditions, that in former days the controlling action of officers on a battle depended chiefly upon what the noise and smoke of the enemy's fire allowed to be seen or guessed, shall we still be able to say that nothing has been changed?

If we are to credit certain authors, the new powder will entail other drawbacks, *e. g.* the impossibility of giving the alarm by firing; the lesser facility given to commanders of marching to the guns on their own initiative; and lastly, the roar of artillery and the rattle of musketry will no longer help to rouse the troops to enthusiasm as they advance to the attack. However, we will see later how far these conditions may be accurate.

Let us commence by defining the visual and acoustic effects of the new powder.

From accounts of experiments carried out at the manœuvres of foreign armies, it has been ascertained that rifle fire is absolutely invisible at a distance of 330 yards, and that at shorter ranges all that can be seen is a light and bluish cloud of smoke, dissolving so rapidly as to

* *Revue des deux Mondes*, 1st November 1888.

† "Das rauchfreie Pulver," 1889.

make it impossible to note the exact position of men under cover. Rifle fire, however rapid, allows the firers to see a great distance to their front. The same remarks apply to artillery fire, for though the smoke is somewhat more visible to the gun detachment, yet it does not reveal their position even at the shorter ranges, and it dissolves so quickly, as neither to hide the objectives, nor allow an enemy, who at very short ranges might catch a glimpse of it, sufficient time to aim. The powder called "ballistite," which we have adopted, and which was tried at the last grand manœuvres, possesses this quality in a higher degree than the compounds used by other Powers, and has therefore the highest claim to the title of "smokeless powder." As regards sound, the foreign authorities on the subject are somewhat vague in computing its range; as a general rule they describe the report as shorter and sharper than that of the old powder. Captain Moch alone, in an article in the *Revue d'artillerie*,* gives a more exact definition, as follows:—"As regards sound, we will admit that a rifle shot, which sounds to the firer like that of a shot gun, can only be heard up to 220 or 330 yards under favourable atmospheric conditions and if the listener remain perfectly still, and becomes quite inaudible at about 440 yards. The report of a field gun sounds short, harsh, and of much less volume than at present."

From what has been published about foreign experiments on this point, from what has been told us by those who have assisted at fire experiments with the new powder, and from our own sense of hearing when present on such occasions, we must refuse to accept Captain Moch's statement.

The report of the new rifle is indeed more vibrating, harsh, and short, and appreciably weaker, but not to such an extent that it cannot be clearly heard at a range of from 550 to 600 yards, and even further. As much may be said of field artillery, the report of a single gun of which can undoubtedly be heard at a distance of several kilometres. Besides, given the enormous pressure developed by the new powder in the rifle or gun, it seems impossible to obtain the additional attribute of silence. For as long as the projectile is propelled by gases, suddenly rising to the maxima of temperature and tension, so long will there be created in the barrel a vacuum immediately filled by the outer air rushing with great violence against the gases, which cool and condense at their exit from the barrel. The combination of these phenomena will still produce the well-known sound of a report, of which we can only consider the greater or less duration, extension, and intensity, though it does not seem as if the difference could be great.

Having thus explained in what consist the special characteristics of the new powder, let us consider their probable action on the development of tactics as relating to, (I.) Reconnaissance and outposts. (II.) The battle-field.

I.—RECONNAISSANCE AND OUTPOSTS.

Troops in movement.—Let us commence by considering advanced cavalry screens and reconnoitring parties.

* "La Poudre sans fumée et la tactique," par G. Moch, Capitaine d'artillerie.

An army, before coming into contact with the enemy, pushes out towards him strong bodies of cavalry, whose principal duty is to *see* the enemy and inform the commander-in-chief of all that is worth knowing as to his strength, his dispositions when stationary, and the direction he takes when on the march. The first hostile contact in the execution of this duty will be with the enemy's cavalry, and so far "ballistite" will come little if at all into play, as fire action will be rare. Smokeless powder will only make its power really felt, when the reconnaissance is pushed a little further, when in other words one of the cavalry forces comes upon their enemy's infantry.

The reconnoitring cavalry, being more visible at long distances than infantry, will then find itself under markedly disadvantageous conditions. The enemy's outposts and infantry patrols will easily be able to lie down, allow the advanced parties to come within good ranges, and then crush them with a rapid and unexpected fire. The cavalry will have no time to look about them, or even understand whence comes the fire, and those amongst them who remain unhurt, having seen little or nothing, will be unable to take back any useful report.

Turning to reconnoitring by infantry, that one of the two parties will be best off, which on the approach of its adversary is stationary and under cover, for it can then similarly avail itself of the advantages of surprise. Again, if both parties are moving, the advantage will rest with that which first discovers the enemy, whom it can then surprise in its own time by a deadly fire.

In any case it will most frequently happen, especially to the advanced parties of reconnoitring columns, that the men will receive the first shots without knowing whence they are coming, particularly as the ballistic qualities of the new powder and rifle will allow of these shots being fired at much longer ranges than was formerly the case.

Such being the state of affairs, it is easy to see that reconnaissance and outpost duty will become vastly more difficult, and that the method of executing these duties must be changed. As a general rule, the forces detailed for them will require to be much stronger than in the past. The two men of the "point" will no longer suffice for the vanguard, which must be preceded by stronger patrols under leaders of greater intelligence, bravery, and coolness, together with sharper eyesight than heretofore. Security of the flanks, besides acquiring greater importance, will have to be assured to a longer distance. It would be absurd for a column on the march to secure its flanks on the old system of sending two men a few hundred yards down any lateral roads, while the third man of the party awaits their return to their starting-point. More importance, too, will be attached to communications between the various advanced parties proceeding on reconnaissance duty, and this will also demand greater strength. And even with larger numbers, it will only be after a long time and some loss, that the advanced exploring parties will be able to gather any positive information, for as Captain Moch, above quoted, remarks, "The enemy's reconnoitring parties will be kept further off, and will be decimated by fire, whilst gaining little or none of the information they are in search of."

We must pause here to note another point, namely, that the formation of the ground will affect the difficulty of reconnoitring more markedly than in the past. In a mountainous country the roads and accessible parts are generally so limited and definite, that neither the attack, which can foresee where resistance will be met with, nor the defence, which knows the modes of access to its positions, will have much difficulty in discerning whence comes any fire which may unexpectedly make itself felt. In such country each force, according to the more or less command in height which it may possess over the other, whether continuously if stationary, or at successive intervals if on the march, will find itself in a better or worse position to see and explore the ground before it. For command in height, however, slight, will cause the enemy's movements in the country to the front to be plainly visible, even though they are no more revealed by the smoke of gunpowder. But reconnaissances will find most difficulty in undulating ground, in which the slightest cover afforded by crops or vegetation may even at short distances conceal some ambush or surprise.

In short, this new state of things seemingly tends to greatly lengthen that early period of every tactical action, which is marked by uncertainty on the part of the officer in command, caused by the want of sufficiently ample information as to the strength, position, and intentions of the enemy. This prolonged want of the information needed for the conception of a plan of action, being naturally a cause of uncertainty and thence of delay in execution, will doubtless add to the difficulties of the attack, and lighten on the other hand the task of the defence. Hence follows the necessity of greater daring on the part of the commanders of even the smallest units. It will be needful that all should acquire the habit of contenting themselves with somewhat vague data to guide them to the fitting decision, and that officers especially should cultivate the great military virtue of *knowing how to defy the unknown*. It may be contended that a risky movement leads to greater loss, but for the most part in war "the greater the risk, the better the result," and such will in future often be the case again. If we do not run the risk, the enemy will run it to our cost. So that our daring may not be thoughtless and rash, but however impetuous, may tend towards the objective to be attained, it will be useful to come to close quarters with the enemy, and to find out as much as we want about him, so as to be able to subordinate it to our plans.

To obtain this result with greater safety, and also to have sounder grounds for depending on the success of a bold stroke, a correct appreciation of the nature and tactical worth of the "terrain" will always be of the greatest value. "Terrain" has always exercised great influence on the dispositions and movements of troops, both in attack and defence. The absence of smoke and the greater accuracy of modern arms, entailing as they do the necessity of making most practical use of all obstacles, cover, and slopes of the ground, will still further increase the value inherent in the "terrain." The troops will be obliged to adapt themselves to the nature of the country, and more so than in the past, because it will be easier than it then was, knowing how to

grasp at a glance the tactical features of the enemy's position, to estimate the nature of its occupation, even though smoke no longer defines the lines of hostile fire. Thus we see how vitally important for every commander, but more especially for one entrusted with an offensive reconnaissance, is the gift of being able rapidly, with a mere glance at the "terrain," to appraise its tactical features, deduce from them the most logical and probable disposition of the enemy's forces, and adopt those measures which may best aid him to attain his object, while in his turn availing himself to the utmost of any advantages offered by the ground.

From the brief considerations above set out as to the duties of reconnaissance and outposts, it appears that we can now, if not definitely lay down, at least discuss the following conclusions:—

(1). *That these duties will become of much greater difficulty than in the past.*—To meet this, it will be necessary that both officers and men should be constantly and carefully trained in peace time. The study of the new difficulties presented should, especially in the battle training, camps of exercise, and grand manœuvres, be considered a matter of the utmost importance, above all for junior officers. Should these latter, when on active service, find themselves unprepared for the difficulties they will encounter, the sacrifice of their persons will be of no avail, since officers employed on reconnaissance and outposts must be not only animated by courage and devotion, but also most intelligent, skilful, and above all conversant with their duties; and this proficiency they cannot hope to attain without long study and great zeal.

(2). *That outpost and reconnaissance duty will necessitate in future the exposure of much larger bodies of troops.*—Cavalry more especially, if it is to retain its main attribute of "the eyes of the army," will have to run greater risks and attempt more daring inroads, without which it will find it difficult to attain its principal object of providing the general with the most useful information. Cavalry officers, above all others, should be skilled in this special duty, and the more so because, as Captain Moch remarks, "The new difficulties to which this duty is exposed will probably entail an increase of officers' reconnoitring parties."

We have pleasure in noting here, that already His Royal Highness the late lamented Prince Amedeus, foreseeing this necessity, had in his inspections of cavalry regiments paid particular attention to the officers, non-commissioned officers, and picked troopers, causing them to go through special experiments. On this point Major Lugli has remarked in the *Rivista Militare* (July 1889), "If we are not mistaken, the reason of the special attention bestowed by His Royal Highness on these principles, and of the able impulse which he has given to their practice, is to be sought for in the supreme importance, which in the methods laid down at present for strategical reconnaissance"—and we would add, tactical reconnaissance also—"is now attached to officers' patrols."

On the same point again Captain Moch questions whether the two cavalry regiments assigned to each French army corps are of sufficient strength to properly carry out so important a task. What shall we,

then, say of the single regiment attached to our army corps? "In fact it is not only," he continues, "reconnaissance duty which is increasing in difficulty. It will also be harder to keep up communication between various co-operating units, and between several columns moving in parallel directions; we shall have to largely increase the number of patrols and small connecting detachments."

(3). *The "terrain" will have more influence on the dispositions and movements of troops, and will increase the difficulty of reconnaissance, especially over flat or undulating ground.* From this we gather that it will be more important than in the past to be able to correctly estimate the "lie" and tactical features of the country.

(4). *That in future the visual faculties will acquire greater importance, as will everything that may tend to help them; and this renders it imperative that officers at least should be as constantly provided with their field-glasses, as they would be with any of their defensive weapons.* Perhaps, as has been suggested, moveable observatories, to be used either with troops on reconnaissance or on outpost duty, may be adopted. But they have the drawback of requiring suitable transport, and their real utility is still doubtful. Finally, we may remark that some recommend the use of specially trained dogs as both possible and advantageous on outpost and reconnaissance duty.

Stationary troops.—Let us now turn our attention to outpost duty, i. e. the duty of safe-guarding troops halted in position. The outposts will find themselves under the same favourable conditions, as regards an advancing enemy, as they enjoyed in the past. Small advanced posts and their sentries have always easily been able to hide themselves from the enemy's patrols, whose movements they could watch from afar, whilst laying some trap for them. Their advantages will now be increased by the fact that the new rifle will allow of their firing at the enemy, at long or short ranges, without revealing themselves to sight. At the same time we cannot say that the attackers' patrols too may not, under some circumstances, and as has often happened, succeed in approaching small posts without being seen, and in such a case the attack would have all the advantages of the new powder on their side, while the posts surprised would naturally be in a markedly inferior position. It is obvious therefore, that great vigilance and above all a sharp look-out to a distance will be more necessary than in the past.

Not only will *look-out posts* acquire greater importance, but the look-out duty of the vedettes will have to be carried out with especial zeal. Look-out posts and vedettes should select the highest positions, climb trees, ascend roofs, towers, and steeples. The men detailed for these duties should have good eye-sight, and field glasses should always be kept at the look-out posts, which should if possible be commanded by officers. If these rules were to be observed in the past, how much greater will not be their importance in the future?

Some authorities have stated that on account of the diminished sound of the report, the outposts will lose the precious resource of alarm shots. A French Colonel, for instance, signing himself "B.," remarks on this point:—"Considering the distances at which sentries are now

posted, whether from the nearest sentry post or from the piquets which furnish them, they will be able to fire even several shots without giving the alarm; at night only will the flash warn the neighbouring sentries of their danger. What may happen to the sentries applies also to the piquets behind them, and then to the main body of the outposts, so that with a little initiative and daring, the enemy may be able to penetrate to the very cantonments of the army, so to speak without a check.*

We ourselves are certainly not exposed to this danger, since in our outpost system the sentries form, as one may say, an integral part of the post which furnishes them, and from which they are not allowed to move more than a few dozen yards, thus remaining well within sight and hearing. The same may be said of the distances of the piquets from each other and from their supports, which undoubtedly allow shots fired from any one of them to be heard.

The proposal therefore which has been made to furnish sentries or the commanders of piquets with special cartridges or rockets, does not apply to us, and such a measure would only complicate matters without any useful result. It would be much better instead that piquets and supports should keep each other constantly in sight,† which would render it advisable, especially in close country, that they should be posted at the shortest intervals and distances now laid down, which should even be lessened under certain circumstances. However, should this be carried too far, it would entail the danger of not giving the supports time to assume fighting formation in case of a surprise of the advanced line. This danger may lead us to introduce another element into our present outpost system, namely, a line of *communicating posts* between the piquets and supports, placing these latter somewhat further in rear. As for the reserves, it is not essential that they should hear the alarm given, so long as they are kept promptly informed by the supports of what is going on in the advanced line. This information will be most quickly forwarded by means of *connecting posts* dropped by the supports on the ground between themselves and the reserves. It will be all-important to increase the number of visiting rounds and reconnoitring patrols, which latter should be sent out to greater distances. So, in conclusion, outpost duty too will require larger numbers and greater exertions, but we need have no fear about the weakened report of the rifle, which after all has not lost so much of its intensity as to inflict on the internal arrangements of outposts the drawbacks which some have anticipated.

II.—THE BATTLE-FIELD.

Let us imagine now that two hostile armies have passed the period of early reconnaissances. One of them perhaps has overcome a first resistance of the outposts, but now they are about to enter into a sterner phase of the strife. On one side a defending force in position; on the other an enemy attacking it.

* La poudre sans fumée et ses conséquences tactiques, par le Colonel B. (Paris, Jouvet et Cie. Editeurs. 5 Rue Palatine.)

† This does not seem to take night work into consideration.—Translator.

To consider the new conditions introduced by "ballistite" at this period, let us treat :—

- (1) of the general conditions of the employment of fire.
- (2) of the special conditions of attack and defence.
- (3) of the conditions of the supreme command.
- (4) of the "morale" of the troops.

(1).—GENERAL CONDITIONS OF THE EMPLOYMENT OF FIRE.

(a) *Conditions of infantry fire*.—The absence of smoke, as we have already seen, is an advantage to all who are in the first line, that is to say all who are able to open fire—the smoke no longer gets in their way, nor does it reveal their position. On the other hand, the second lines, namely, the supports advancing behind the firing line, the reserves, the cavalry on the flanks awaiting an opportunity to charge, and in general all who cannot use fire action, lose with the new powder the advantage of having their movements more or less hidden behind a protecting veil of smoke. So great indeed is the value which some authorities attach to smoke as affording cover from view, that they—Colonel B....., above quoted, for example—urge the adoption of certain chemical compounds which on ignition emit dense clouds of smoke, so as to allow either the attack-troops to advance with the fewer losses, or the defenders to abandon an untenable position with relative safety.

Without discussing the possibility or value of such an innovation, we may say that it will be more than ever necessary for the units in rear of the firing line to make constant use of the least vulnerable tactical formations, and, as far possible, of any cover afforded by the ground, so as to diminish the probability of exposing themselves to view.

There is no doubt that the new powder brings marked advantages to the troops actually in the firing line. It is true that the enemy will be less visible at long distances, because he will no more be revealed by the smoke when he opens fire. But at those ranges at which fire really commences to tell, and at which the enemy cannot well remain under cover, unless he ceases to advance, the soldier will be able to see his mark clearly, aim better at it, and obtain a result which he was far from even approaching with the gunpowder and weapons of former days.

(We can easily see that such conditions favour the defensive, and we will consider later the value of the advantages which the latter obtains).

Officers will find it easier to maintain fire discipline, for the view will not be obstructed by smoke, and commanders will be able to direct the fire of their units on the most vulnerable points ; no longer will they miss those brief moments during which the enemy exposes himself to view, whether to fire better or to advance—brief moments which often in the past the dense cloud of smoke did not allow them to discern in time. Officers will also be able to avoid waste of ammunition by ordering the fire to cease or slacken as soon as a given effect has been obtained ; a measure not always possible when the front was covered with smoke. They will be better able to watch the individuals composing their units,

who in their turn will hear the words of command better. In short, the officer will have his men better in hand, and the more so as for the same reasons he can be more promptly and better seconded by his non-commissioned officers, while he can himself more easily support the action of neighbouring units.

(b) *Conditions of artillery fire.*—Artillery too will with the new powder find itself under different conditions, by which on the whole it will greatly benefit. We must take the case of a number of batteries massed and concentrating their fire on a common objective, because the employment of artillery now-a-days tends to this method, as that best calculated to bring into play the characteristic features of the arm. The smoke of these batteries used to occasion great difficulty in laying the guns; the free field of view of the gunners and higher ranks will cause this to be much easier, while the absence of smoke, whether from our own guns or from the hostile artillery we may be engaged with, will greatly facilitate observation of the points of fall of the shells.

Another advantage for artillery will be that the positions of batteries will be less visible. On this point, however, we may note that the gain is not so great for artillery as for infantry, on account of the greater difficulty the former will experience in obtaining cover from sight. Artillery indeed, in order to profit by all the advantages of smokeless powder on this last point, should never expose itself in the open. Some fold of the ground, hedge or other cover offered by cultivation, should be easy to find and profit by in almost every country. Whenever, for instance, the ground is such as to make it needful to place a battery on a hill, where it is difficult to obtain cover from sight, the guns should not be placed on the crest itself, but preferably rather in rear of it, or else, when the gradient allows of it, on the anterior slope. Again, in places where it would be useful and there is time, however short, to spare, it would be advisable to throw up a hasty intrenchment to cover the guns. We do not mean to say that artillery should not take part in the action even though these desiderata be unobtainable, because its duty will always be to act when it is wanted, even without shelter, and in spite of the losses to which it may be exposed. Our point is that from henceforward it will be necessary for artillery to pay greater attention to obtaining natural cover, so as not to throw away one of the most useful advantages afforded it by the new powder. As regards distinguishing their target, artillery will in future labour under greater disadvantages. For, as guns have to open fire at long ranges, they used formerly as a rule to select as their objectives those points which were more or less pointed out to them by the smoke of the enemy's fire. In future this revealing cloud of smoke will not be seen, and this will make it more difficult, especially for the artillery belonging to the attack, to find an objective on which to direct its fire. Artillery will have to devote greater attention to this point, availing itself when needful, of special look-out men trained for the purpose and provided with field glasses and telescopes; it will have to act on assumed data, and sometimes will not know on what to open fire till it has received information from infantry reconnaissance. But, the target once found,

whereas formerly the smoke of the enemy's fire impeded observation of the fall of the projectile at all but the shorter ranges, now on the other hand it will be possible to watch the results of the fire even at extreme ranges, and hence more easily and quickly to correct the aim.

As regards the laying of guns, one was of old obliged to aim at a floating cloud of smoke, which was far from representing the object sought to be struck. In future a clear and well-defined target will be open to aim at, with the inevitable result of increasing the accuracy of the fire.

Some authorities would like to press also the advantage of the weakened sound of the report, which they contend will allow the fire to be better regulated, by the fact that the lengthy and detailed commands often necessary will be better heard. But as we have already said, it is not to be expected that the report will be weaker to any such degree as to cause this advantage to be felt, especially in the case of massed batteries.

In conclusion, the most immediate and certain effects of the new powder, as regards the absence of smoke, are as follows:—

- (1). It improves the conditions of the execution of fire and of fire discipline.
- (2). It facilitates the view of the enemy's movements, and therefore renders the selection of fitting objectives easier; a selection moreover rendered still more easy to infantry by the comparatively short ranges at which it fires.
- (3). It creates a difficulty in discerning the position of the enemy's firing line. Artillery find it difficult to discover a fitting objective for their fire.
- (4). The supports advancing up to the firing line are more easily seen, as in general are all bodies of troops in motion.

Are these results such as to substantially modify the tactical development of the battle-field? We think not. They may in fact be described as advantages and disadvantages, appearing at various moments either on one side or the other, to the lightening or augmentation of its task. A greater expenditure of strength and time will be necessary, as compared with the days when the old powder was used. The difference between the past and future will therefore possibly consist in some variation of the tactical system, but the principles and models according to which it must be worked, remain unchanged. We shall be convinced of this by considering the deductions to be drawn from the new conditions of fire we have treated of above.

As regards infantry the following axioms may be deduced:—

- (1). *The increased importance of natural cover.*—This arises from the greater necessity for cover from the enemy's view and from the effects of his fire, especially at medium and short ranges. This cover will also favour the execution and efficacy of surprises.
- (2). *The necessity of employing the least vulnerable tactical formations.*—This applies especially to the supports, reserves, to all troops in short, which have to advance without opening fire, and which also, no less than the firing lines, must make the fullest use of natural cover.

The commanders of such troops therefore must pay continual attention both to the effects of the enemy's fire, so as to promptly take up the least vulnerable formation; and to the nature of the ground, so as to make the best use of any advantages it may offer.

(3). *The greater difficulty of recognizing one's position during a battle.*—Formerly lines of smoke clearly indicated the troops engaged, and the positions and whereabouts of the enemy, but now these will no longer be so evident, though, as we have said, the view will not be impeded by smoke. It will therefore be more difficult to form a correct idea of how the battle is tending at various points, and it will be easier and more probable that various parts of the force should here and there be either separated or clubbed together, should unwittingly change their direction, and unexpectedly find themselves either with an enemy on their flanks or between two fires.

(4). *The greater necessity of combined action.*—We have already urged this necessity as relating to the advanced guards of columns on the march; but the need of it is even more strongly felt on the battle-field, because communication is harder to keep up, and when it is interrupted, the results may be much more serious.

Now from all the above considerations, which reveal the existence of greater difficulties than of old, requiring probably the employment of larger forces and also greater skill in the commander, we cannot conclude that infantry tactics as now understood should be entirely changed.

There are two lessons to be drawn from the new conditions under which artillery fire is placed:—

(1). *The increased value of any cover offered by the ground, which we have already discussed.*

(2). *The greater importance which the artillery arm has acquired owing to the increase of its power.*—This increase is due, not only to the more valuable ballistic qualities of the new powder, but also and perhaps even more, to the improved conditions of the execution of fire, due to the absence of smoke.

As regards artillery too, we must come to the conclusion that nothing has happened to cause any fundamental change in its tactical action. But in order to understand this better, we must consider some questions which have arisen as to the employment of artillery fire.

Many entertain and some few have publicly propounded the idea, that artillery fire should be opened at much longer ranges than in the past. A range of 2,750 yards is that at which up to the present it has been considered that artillery fire commences to be efficacious: this range was determined, not so much by the ballistic qualities of artillery as by the visual powers of the gunners, the difficulty of regulating the fire at any greater distance, and the impossibility (for field and horse artillery) of using optical instruments, which, if they had to meet exacting requirements, would certainly be bulky, complicated, and impossible to transport on a battle-field.

We have already noted that in future the gunners will no longer be impeded by smoke, and that the guns will be less visible to the enemy at long ranges. In past times artillery, if it caught sight of the enemy

at a great distance, could not do otherwise than advance rapidly to the front, because to have fired at extreme ranges would have been to court all the disadvantages of smoke without any compensating advantage. Now-a-days, however, once the enemy has come into sight, even at 4,400 yards, the artillery should surprise him with their missiles, rapidly secure a superiority in fire, and make full use of the fact that the great range will render the enemy uncertain of what strength he has to encounter. In short, if in these days the artillery were to advance on first catching sight of the enemy, they would run the risk of being seen, and thus losing the initiative of the fire action.

Such are the ideas which we have referred to above as being largely entertained, and as regards them we will admit that artillery, on discovering its enemy, will be sorely tempted to take up a position at an extremely long range. We will go so far as to say that in some circumstances artillery fire may be effective against an enemy in very compact formation even at distances beyond 2,750 or 3,300 yards. But we must remember that the visual powers of the gunners, though no longer impeded by smoke, are not actually made stronger by its absence, and also that all the other factors determining the maximum effective range of artillery will not be easily displaced. On these grounds therefore we must conclude that the opening of artillery fire at ranges greatly exceeding those deemed suitable in the past, will be an exceptional measure, only to be adopted under special conditions of ground, and with a clear field of view and suitable objective. If any of these conditions are wanting, the artillery must open fire at the same ranges as those which are now considered as the most suitable.

But having reached these ranges, to which the main portion of the artillery of the attack should always be pushed forward, will it be right that the guns should subsequently change their position, and advance nearer to the enemy? Some authorities, amongst whom is Captain Moch, already quoted, considering that with smokeless powder it is more necessary that artillery should conceal its movements and positions, that it will find this harder to do the further it advances, and that the greater visibility of the objective and the improved ballistic qualities of the new powder render it inadvisable to carry on the artillery duel at too short a range, are of opinion that the 2,750 yards range is the one from which the artillery can best finish off their struggle with the enemy's guns, and prepare the infantry attack. These reasons do not appear to be so cogent as to cause us to forsake the maxim laid down in our "General Rules for the employment of the three arms in action." This maxim is, that whilst the infantry of the main divisional body is advancing, the guns must move forward to within *decisive range* of the enemy's artillery, *i. e.* to within less than 2,000 yards of it. From this range they must continue firing at the hostile artillery until they have obtained a *decisive superiority of fire* over it; so that they may then from the same range turn their fire on the enemy's troops with a view to preparing the success of the infantry attack.

As to the method of supporting the infantry attack, Captain Moch maintains, that whereas in the past it has been generally admitted that

some batteries should accompany the infantry up to within 880 to 660 yards of the position to be assaulted, yet this will be inadmissible in the future. Should the old method be persisted in, the batteries on arriving at 1,100 yards from the enemy, would be received by volleys executed under most favourable conditions, and their rapid annihilation under the eyes of their own infantry would be of demoralising effect on the latter. Captain Moch is therefore of opinion that the few batteries, and they should be very few, which accompany the infantry, should only do so up to within 1,650, or 1,300 yards at the most, of the position, while the remainder of the artillery redoubles its fire from the 2,750 yards range. Our opinion on the other hand is that the artillery, even in this last stage of the fight, should not infringe the "General Rules" above quoted. These rules, though published before the adoption of smokeless powder, lay down as a general maxim, as we have already seen, that the guns, "firing from about the decisive range of the enemy's artillery (between 1,750 and 2,000 yards) are to co-operate towards the success of the attack by directing their fire on the hostile infantry occupying the point or points on which the attack is to be directed." This task will be all the easier for the artillery (even from the longer of the two named ranges), since the absence of smoke clouds between the two opposing infantry forces allows it to regulate its fire more correctly and without any fear of striking its own infantry. But the General Rules also consider, and very rightly so, having regard to the configuration of our own country, the case in which the artillery (without specifying in what strength) may be obliged to advance to within even less than 1,100 yards of the enemy. We will quote the General Rule:—"If from the normal decisive range (between 1,750 and 2,000 yards), the artillery is unable to clearly see the effect of its fire, or if it cannot distinguish its own infantry from that of the enemy, it is to take up, if the ground allows of it, a second and more advanced position. The guns are even to advance into the infantry firing line, without regard to the losses which they will suffer from musketry fire, but this step will never be taken unless by this means only (and this is to be noted, *by this means only*) the artillery can co-operate effectively towards the success of the attack."

All we have said tends therefore to prove that there is nothing substantially changed in the tactical action and in the employment of artillery, nor in the objects which it must seek to attain. If there is anything new and really important in artillery action as developed by smokeless powder, it is, as we have before remarked, the great improvement in the conditions of fire action, and also the considerable increase of destructive power due to improved ballistic qualities. So that we may conclude on the whole, that future battles will see a great increase in the importance of artillery, if skilfully handled, and that a predominance of artillery fire will even more surely than in the past pave the way to ultimate victory.

As regards cavalry, we must recognize that, as it is always affected by every modern improvement in fire arms, *e. g.* magazine rifles, so will it again be affected by smokeless powder. *The tactical value of the arm*

cannot but be greatly diminished, because favourable opportunities for a cavalry charge will be fewer.

Here we must note that from either point of view, whether unfavourable or the reverse to cavalry action, there are writers who plunge into the wildest exaggerations. From the first point of view some authors, mostly French, assert that the battle once opened, cavalry need only return swords and remain in "offensive expectation," that is to say, in watch until a panic, a partial reverse of the enemy, or the general success of their own side, allows an opening for charge or pursuit. Others again, amongst whom is a German writer, consider that though formerly a cavalry charge was not easily successful, yet in future, when its terrors are no longer hidden from the infantryman by smoke, it will have such a moral effect upon the latter that he will shoot vilely, even when he does not break and run. Therefore they regard the success of the majority of cavalry charges as assured.

We do not agree with either of these extreme views; we prefer to say with Major Allason in his recently published pamphlet* that, "Moments will still occur upon the battle-field, in which a dashing cavalry charge may lead to incalculable results. Those moments will be fewer, harder to seize and to profit by; but there is still an opening for the Bredows and the Bechtolsdheims of the future, and therefore that bold and dashing spirit which is a valuable characteristic of cavalry, is not doomed to total extinction."

We must now point out two other consequences, resulting from the new conditions of fire action, which do not refer specially to any one of the three arms. They are as follows:—

(1). *The fact that the difficulties we have considered, and the improvements in modern fire-arms, will render the first stages of the battle, namely, those of reconnaissance and preparation considerably longer. On the other hand, the final or executive stage will be greatly shortened.* When speaking generally on reconnaissance, we noticed how the new state of affairs will contribute to lengthen the process. The same may be said of the first stages of the battle. In fact, the state of uncertainty of the chief commanders at the beginning of an action; the necessity of employing stronger forces in the necessary movements that may be ordered; the facility of falling into an ambush and the necessity for avoiding it; the difficulty in ascertaining one's true position in keeping up communications &c.; all this must contribute towards rendering the stages of reconnaissance and preparation both slow and laborious. On the other hand the increased power of artillery, and the greater effect of rifle fire at medium and short ranges, taken together with the dense masses of troops which will be crowded on the firing lines in the final decisive stage, will cause the solution of this last period to be more speedily reached than in former wars.

(2) The second consequence, which we have already touched upon when dealing with reconnaissance, is as follows:—

* "Considerations on Smokeless Powder," by V. Allason, Major of Artillery. C. Voghera, Rome, 1890.

A correct estimate of the tactical characteristics of the "terrain" will prove of more value than in the past to all commanders of whatever rank. As is well known, the features of the ground either favour or are adverse to in various ways the execution and efficacy of tactical movements and acts—as for instance, the employment of fire, approaches, observation, communications, extension, and so forth. Since therefore, as we have already remarked, the importance both of the features of the ground and of their skilful use is constantly increasing together with the difficulty of finding one's position, of keeping up communications, of outposts, and so on, it must be clear that it will be most essential to be able to promptly and correctly recognise the features of the country and their tactical possibilities; and this not only so as to make full use of them for our own troops, but also and even more, to enable us to foretell the probable influence which any given ground will have on the enemy, and thence his future dispositions and movements.

Having thus considered the principal and most direct consequences of the new general conditions of fire action, we must repeat our already expressed conclusion, that great as may be the influence of smokeless powder on tactics, serious as may be the difficulties, and important the changes in details, which it may entail, it cannot substantially modify our tactical action. On this point we cannot agree with the ideas of Colonel B.,—above quoted—who in the pamphlet, "*La poudre sans fumée et ses conséquences tactiques*", comes to the conclusion that the new fire tactics must consist in making use almost exclusively of long range fire, and in advancing almost without firing from the medium distances onwards.

Let us take his own words:—"To make a judicious and rational use of the new arms, we must fire at long ranges, at extreme ranges, not only in the artillery, but also and perhaps even more so in the infantry—at ranges which will seem fabulous to timid minds clinging to the antique formulæ and obsolete sayings which nursed their childhood." "To fire at long ranges", he continues, "and advance at short ones, advance almost without firing;—such must be the rule of the new tactics, especially as with smokeless powder the accuracy of fire will be such as to cause any halt in the fire-swept zones to be fatal to the attacking troops."

Again, in support of his theory, Colonel B. quotes the French General Philibert, who, after having discussed the method of execution of long range fire, remarks as follows:—"In this opening period, everything must be slow and methodical. When on the other hand, one comes within effective range, then is the time to hasten forward and accelerate the onward movement. To slacken the pace at 660 yards, and to make halts up to 220 or 160 yards would be playing into the enemy's hands; it would give him time, after having clearly shown him the point of attack, to bring up his reserves, reinforce his firing line, and multiply his means of resistance at that point. Your attack once decided on and well prepared, you must go straight to your front, advance, and cover with a rush all that separates you from your enemy: no more deliberate halts, the faster you go the better for you. If you halt, you will fall back, it is fatal."

From our point of view, we should be rather pleased than otherwise to be confronted in war by an enemy who had adopted this method of tactics: long range fire, and continuous advance from 660 yards onwards. His long range fire could not have much moral or material effect. To meet his attack, we should reserve our ammunition for the ranges at which fire has a really important effect, so as to be certain of inflicting crushing losses on our enemy, who would then be engaged solely in advancing. We should transpose to the defensive the tactics of the Germans in the 1870-71 war, who when they came at long ranges under the fire of the French Chassepôt, which carried much further than the German Dreyse, were thereby led to rapidly approach their enemy, both to avoid loss and to bring their own weapons to bear—in other words, we should reserve our fire. Although Colonel B. declares that the French did not make sufficient use of the ranging powers of their rifle in the opening battles of the war, we know that it was precisely because they placed too much confidence in those powers, that when they saw their enemy advancing with increasing boldness, they began to lose trust in the virtues of their Chassepôts.

But enough on this point, as it is needful for us to disprove *and* *refute* foreign tactical systems.

II.—CONDITIONS SPECIALLY AFFECTING ATTACK AND DEFENCE.

Some authorities contend that one of the results of the introduction of "ballistite" will be that in future, infantry, being liable to suffer heavy losses from artillery fire at extreme ranges, will be forced to extend very early; that the supports and reserves, being constantly exposed to view, will lose very heavily, and will therefore be speedily attracted to join the firing line so as to be able to answer the enemy's fire.

We cannot wholly agree with these deductions, which we contend should be based less on the absence of smoke than on the nature of the ground, the advantage taken of it, and the greater or less manœuvring skill shown by the attack. The conclusion that we consider really justified, as we have already shown, is that the material conditions of fire action being greatly improved by the new powder, it is the defence that will be able to take the greatest advantage of this improvement. Let us consider the case. It is not sufficient in a battle to hurl projectiles at the enemy; but, if a victory is to be won, a superiority of fire over the enemy must be obtained, ground must be gained, and his positions occupied after his disorganization or destruction, and all this cannot be attained without exposing oneself to fire. This shows that however deadly the enemy's fire may be, it is still absolutely necessary that it should be faced, both by the attack in their advance, and by the defence in any counter-attack they may make. Hence the great improvements in the conditions of fire action, though of profit to both sides while they are actually firing, still will place in a disadvantageous position the force which is obliged to expose itself, and advance in order to gain ground. For this advance will be clearly seen, and will suffer greatly from an enemy who stands steady, and ready to fire on it. Now, as purely passive defence is inadmissible, and the "rôle" of attack and defence

on the battle-field will constantly change sides either in one place or another, or along the whole front, so the absence of smoke will at different times and places be favourable or the reverse to each one of the two adversaries. But on the whole the greater advantage,—so far as regards the effect of their fire—will be to the side which has most consistently taken up a defensive attitude.

Should we conclude from this, that in future the defensive will hold the predominance in tactics? or, in other words, that the improvements in the new armament, together with the free choice of the ground to act upon, will give the defenders such advantages as to render it necessary to modify the modern system of tactics, in the sense of giving the preference to the defensive, meaning by this the defensive-offensive?

Undoubtedly the defence can make the most profitable use of smokeless powder, can keep more under cover, observe the enemy's advance, and allow him to act as he sees fit on ground which is favourable to him, while awaiting a more opportune moment for an energetic counter attack with good hopes of success. But we must remember that the attacking general too will not execute movements solely to expose his forces to view. His principal means of action will be fire: artillery fire to facilitate the extension and approach of his infantry, and infantry fire at long and medium ranges to prepare the coming conflict. He too will find positions to open fire under favourable conditions, and the absence of smoke will then give him the same advantages as it does to the defence. He will take good advantage of the cover afforded by the ground, and though he will find it more difficult than in the past, he must eventually by reason of his superior numbers reach a range whence he can obtain decisive results; and here a thorough preparation of the assault, by a fire which has never attained such efficacy as it will have in the future, will place a great number of the chances of success in his favour. "The preparation of the attack by fire," remarks Captain Moch in his book, "has now assumed such importance that its result will also decide the issue of the day. *When preponderance of fire has been gained, the possibility of assuming the offensive is definitely secured,* and if the attack has been properly prepared, it will merely consist in showing the enemy the bayonets; very rarely will it be necessary to make him feel them." If then fire plays such an important part in the attack, we must not imagine that the material advantages of the defence, though much superior to those of their enemy, will be such as to place the two sides under excessively disproportionate conditions, and the less so because the attack if successful at one point, will be successful everywhere, while the defence must keep its entire line unbroken to gain a victory.

If besides all this, we take into account the moral superiority of the attackers, the confidence which arises from the consciousness of this superiority, the advantage of the initiative, by which they impose their plan of attack on the enemy, it seems, to say the least, very doubtful whether smokeless powder will turn the scale altogether in favour of the defensive, and yet it is not a case on which any doubt should exist. On this point Major Allason, above quoted, remarks, "The superiority of

One over the other (offensive and defensive) depends on material facts and moral circumstances. As to the first, the new powder increases the number of chances favourable to the defensive, but does not alter the second, which still undoubtedly work to the advantage of the attack. The defence will henceforward, more than in the past, possess the material factors of success; it will present, materially speaking, a better front to the attack. But in the end the offensive will always prevail, because the attacker has in his favour an irresistible moral superiority, born from greater confidence in his strength or conviction in his material resources; from the possibility of gaining the day by success on a single point; from the initiative which gives him the choice of the time and direction of the attack, and which allows him to conceal both one and the other by feigned demonstrations."

III.—CONDITIONS AFFECTING THE COMMAND-IN-CHIEF.

We have already pointed out, when dealing with reconnaissance, that by reason of the absence of smoke the various commanders will during a somewhat prolonged period of the tactical action find themselves in a state of great uncertainty on all the points which it is important that they should be acquainted with. We can obviously infer that this drawback will affect on an ascending scale all up to the commander-in-chief himself.

All authorities indeed agree as to the increased difficulties of the task of the officer who has to direct a battle, dispose his forces before an enemy about whom he will never have much information, mass his troops whether on one point or the other, and work them without confusion towards the main objective of the day.

In former times the general, who was never in the din and smoke of conflict, and who when possible took up an elevated position from which he could survey the progress of the battle, was much helped by the smoke in following the various phases of the conflict even in the furthest parts of the field. The smoke speedily told him of the arrival of fresh forces on any part of the fronts of the two armies, and helped to guide him to the most opportune moment for the despatch of reinforcements. The absence of smoke will annul these advantages, so that the general, instead of being able to see for himself the existence of many facts, will have to rely on information received from his subordinate commanders, who, being themselves in a state of great uncertainty, will often furnish only very vague and contradictory reports.

Therefore the "rôle" of the officer commanding is rendered more difficult by the absence of smoke. What we have just said, however, refers to a general who has the whole scene of action within his field of vision, that is to say it relates only to minor engagements or to a definite section of a more important battle.

As regards this latter it seems as if the conditions of the command-in-chief were not much changed by smokeless powder. Let us hear what Major Allason has to say on this point:—"We notice first," he remarks, "that as far as regards great battles—battles which decide, if not the whole war, at least a lengthened period of it—difficulties of

executive control are by no means anything new. They have nothing to do with the suppression of smoke, but are an inevitable consequence of the extension of the actual battle-field. The absence of any immediate executive control may already be noted in the principal battles of the Franco-Prussian war: at Gravelotte-St.-Privat the German headquarters did not hear what had happened on the left of their line till the morning after the battle. If it be true, as is maintained, that in future wars the chief battles will be on an immensely larger scale, then the absence of smoke has no further effect to produce, or any influence that will be of value, as far as regards the chief command in an important battle."

It seems, however, that the influence of smokeless powder, if not directly felt, because the numbers of modern armies and the immense extension of their lines of battle oblige the commander-in-chief to place himself in a position where he can see nothing of the more advanced troops, can yet act indirectly. If as we have seen, the difficulties of reconnaissance, whether to a distance or near the army, have greatly increased, if all the subordinate commanders will frequently find themselves face to face with the unknown, or exposed to surprises and ambushes, we consider that the commander-in-chief too, who must regulate his own action—especially his plan of battle—on the reports received from reconnoitring parties and from subordinate commanders, must also find himself at considerable disadvantage.

It is true on the other hand that, the battle once commenced and fairly engaged, neither the commander-in-chief nor even perhaps the commanders of armies, can exercise a direct control over it. Their action is confined to the period preceding the battle; for when the various army corps have been assigned their objectives and have come in contact with the enemy, only their own commanders and those of the divisions under them can retain any real directing influence on the battle-field. Now, when we say *directing influence*, we intend to allude to the commander who can use efficacious control during the duration of the battle, and his task, since the adoption of smokeless powder, seems to be burdened with greater delay and embarrassments before entering into the conflict; and with greater doubt and uncertainty while it lasts.

What remedies can we suggest for the increasing difficulties in the way of the commander-in-chief and chief commanders of an army? Several have been devised and proposed, and we will consider at least the principal ones, as follows:—

(a.) *To be provided with a cavalry, which, understanding the importance of its mission in future wars, should be trained to perform it with all the dash, self-sacrifice, and intelligence which such a duty requires.* It will in fact be necessary that the cavalry should at any cost keep the various commands well informed; that to fulfil this duty they should search out the enemy without rest, and make inroads into his lines even at serious loss, so as to bring back information, not as formerly doubtful or of small value, but absolutely certain and of real importance.

The expression of a wish for highly trained cavalry does not solve the problem we have before us. But there is no doubt that cavalry

work carried out as it should be, will prove a most valuable aid to the commander-in-chief. We all know what inestimable services the German cavalry rendered to their head-quarters staff in the 1870-71 war. It would be desirable that in our future campaigns we should have a mounted arm even better than theirs, and to obtain a cavalry which should reach the level of the latest advances in tactics, we must, besides a good preparation of the material in horses and men, and a thorough and continuous tactical training of both non-commissioned officers and troopers, pay special attention to the recruitment of our officers. On this point it seems desirable that the posting of cadets leaving the Modena school to the cavalry should be guided, not, as is for the most part the case at present, by their personal wishes, but by the aptitude not only physically, but still more intellectually, which they display for service in that arm. All must agree as to the high importance of a proper selection of cavalry officers, and in the necessity that their professional instruction should be especially accurate. The German regulations on this point are a good deal more exacting than ours; suffice it to say, that among the conditions which an officer must comply with before entering the cavalry, they lay down that he must be able to swim, carry out unaided the destruction of railroads, be able to make use of the telephone, and be acquainted with the first practical principles of telegraphy.

(b). *An increase in the numbers of the head-quarters staff.*—The necessity of increasing the numbers of these assistants to the commander-in-chief will certainly be felt, and the adoption of this measure will doubtless prove of great value. The proper execution of the general's orders often depends on the personal courage of the officers of his staff, on the zeal and skill with which they fulfil the duties entrusted to them; but it does not follow that the increase of their numbers will enable him to derive a proportionate advantage from them. We must remember besides that the more skilled and numerous these officers may be, by so much the more will they frequently view matters in a different light and under different aspects to those under which they would have appeared to the general himself.

"To maintain", writes Major Allason, "that the number of the intermediaries by whose means the general keeps himself informed as to the progress of the battle, the state of affairs at various points of the field, and despatches his instructions, plans, and orders, should be increased, seems to me to be a very inadequate proposal. It may substitute some one officer's ideas for another's, but never, or very imperfectly, will it be the means of conveying the general's instructions to his subordinate commanders."

However we must admit the need for a greater number of officers on the head-quarters staff, to send to the troops engaged, to observe the progress of the action in various parts of the field, and report on it. Subordinate commanders often have neither time, means, nor leisure to report as to how the action is going; it is therefore advantageous that the general should himself send for information. On the whole, this proposed increase of staff officers, though not of great value, will have some utility.

(c). *To allow greater discretion to subordinate commanders.*—This, rather than a remedial measure, will be an inevitable consequence of the difficulties imposed by smokeless powder on the officer commanding at a general engagement. Even in the last wars, the extension of the field of battle and the great increase in the numbers which took part in it, augmented both the importance of and the discretion necessarily left to, the commanders of minor tactical units. In the future too it is they who will see most of the action in the firing line, and who will be led to act on their estimate of the situation without awaiting orders from superior authority. But if this independent action may have great advantages, it may also, unless confined within strict limits and used with the greatest skill, lead to disaster. Especially when attacking, may it prove fatal to allow the junior officers who may be with the firing line to guide the action as they think best.

These officers can only see that part of the field of action which is in their immediate neighbourhood, and cannot possibly be aware of what is going on elsewhere. If they attack before the right moment; before the troops in rear have been able to reach effective supporting distance; or, in short, before the general disposition of the forces in accordance with the orders of the commander-in-chief is complete and ready, the most serious consequences may result, and equally so whether the premature movement be abandoned to its own resources, or whether it be joined in and supported by other troops. In the first case the untimely attack will sacrifice troops uselessly, perhaps disclose to the enemy what head-quarters intended to be concealed from him, and in any case will forewarn him of the coming attack of the main-body, and allow him to prepare to parry it. In the second case the troops in rear and on the flanks will be drawn into an action that has been insufficiently prepared, and is therefore not uniform, but disconnected and inopportune. As it will be very difficult, if not impossible, to cut short or reorganize this action in time, it is most improbable that it will have a successful result. In either case the battle will be waged under disadvantageous conditions, and against the will of the commander-in-chief. We have already several instances to quote. The battle of Wörth, for instance, was brought on by the officer commanding the advanced guard of the 5th German army corps against the will of the Crown Prince, in command of the 3rd German army. The issue of the day was, however, in favour of the Germans; but what would have been the consequences if, as might have happened through some error, the French had been the victors in that first great battle?

From all this it can be understood how necessary it is that, with the inevitable increase of the discretionary powers of subordinate commanders, there should be a similar increase and improvement in professional studies, intelligence, and strength of character, which, by moulding the abilities of the various grades in one uniform direction, tend to produce unity of the action of subordinate commanders with the plans of the commander-in-chief.

It is true, as Major Allason remarks, "that to lay down that it will be more needful for commanders of small units to possess that energy

and intelligence which characterize the true soldier, so that all may work in unison, without possibility of consultation, towards the objective aimed at by the general—is rather the expression of a wish than the indication of a solution to the question. Below certain ranks the *disciplined concord of minds* is an expression devoid of common sense." This however does not alter the fact that the difficulties of war, for the lowest as well as the highest ranks, have greatly increased, and that amongst the measures which best prepare an army for its task, the more thorough professional instruction of officers and non-commissioned officers of every rank is one of the most important. The more thoroughly officers are convinced of this necessity, the more eagerly will they strive to fit themselves for their task. This conviction will likewise be of value to those who have to organize the army, for they will understand—for instance—that the conditions of modern war will not allow them to provide an increase of officers in times of need by pushing young cadets hurriedly through a shortened course of instruction.

If therefore it is inevitable that greater discretion should be left to subordinate commanders, we must endeavour to draw all possible advantages from these extended powers, and at the same time to minimize their drawbacks by more thorough professional instruction.

But we must add, that the value of officers does not depend solely on the degree to which they have been professionally instructed. We have already said that professional study, intelligence, and strength of character are important points, but it is above all a question of *strength of character, temperament, and nerves*. Moltke has said that to be victorious one requires soldiers (and *a fortiori* officers), who can bear up for fourteen consecutive hours under the tremendous moral strain which is felt during a hard-fought battle. Only a man with well-regulated nerves can bear up under the strain; the others, after a short time, will endeavour to escape from their mental torture even by rushing madly forward, so as to do something which may relieve the extreme tension from which all their faculties are suffering. There are some who prefer to seek sudden death rather than remain any longer exposed to this torment. Very often it is *fear* which is the motive of an escape towards the enemy. We must therefore take heed of this point also, that—taking into account the continual improvements in our armament, and our improved professional instruction—we shall also require our officers and all our non-commissioned ranks to possess firmer characters and better disciplined minds.

(d). *To keep strong reserves in hand, and use them only when the situation is clearly defined.*—This amongst others is a measure which may prove of the utmost utility to the commander-in-chief.

It however this is intended to refer, as seems probable, to the general reserves, which are at the disposal of commanders of the larger units, the fact of their being strong reserves will only prove of value when the battle is in an advanced stage. Now, as regards the reserves, we hold as follows:—

If it be true, as has been seen above, that in the battles of the future the period of reconnaissance will be greatly prolonged and will

require the employment of stronger forces ; if in other words companies will be required where formerly sections were sufficient, and battalions where companies used to be employed ; if strong battalions will replace weak ones, and so on in succession ;—all these facts seem to lead us naturally to a conclusion. And that conclusion is, that each commander of a larger unit, in the disposition of his forces (having regard to the object to be attained, and taking fully into account the forces on his flanks and the security of his exposed flank, if any) must make it his object to diminish as far as possible the extension of his front, and must endeavour instead to obtain a greater depth for his forces. By this we mean to say that his forces should be employed, not fractionally, but in a formation of greater density.

Having regard to the great uncertainty prevailing in a modern battle, the ideally perfect system would be one by which every commander of a company, battalion, regiment, brigade, and so on, according to the limits of time and space in which he can make his action felt upon the battle as a whole, should always have at his disposal a reserve consisting respectively of a section, company, battalion, and so forth. These would be employed to put fresh life into the struggle where necessary, to strengthen any point which the enemy appeared to threaten in force, to provide against unforeseen circumstances, or for any other purpose. These reserves working in connection with the general reserves, would not be exhausted sooner than those of the enemy. But this ideal formation cannot always be attained, especially as the strength of the above mentioned bodies of troops is always the same, and it would be dangerous to fritter it away in detail. If therefore on one flank it happens that the larger supporting units have joined the firing lines rather sooner than they would have done so heretofore, and on the other flank fresh troops are unceasingly required, it seems that there should be an increase in the number of separate reserves, that is of lines which can be successively pushed into action. Each of these lines, as it comes into action after the preceding has either succeeded or failed in obtaining a given result, has the advantage of seeing the state of things more clearly. So then, the more numerous these lines, the better will their commanders be informed of the general state of affairs, and, while the leading ones will render easier the task of those which follow them, these latter will be able to obtain results which were beyond the power of their predecessors. This is not the place to enter into the practical working of this idea, which may besides be varied in details ; we will only remark that what we have just said may be paraphrased as follows :—To increase the number of reserves, and to dispose one's forces on the least extent of front and to the greatest depth that the limits of time, space, the plan to be carried out, and the presence of the enemy, will allow.

(e).—*There are various methods of transmitting intelligence, which may be used to bring or send to the commander-in-chief news of the progress of the battle. Amongst others we may mention the use of balloons, of visual signalling, electric telegraphy, of transportable observatories, &c., &c.*

But these will all come under the category of the various appliances, which the progress of science furnishes to the art of war. Though the

fullest advantage should be taken of them, they are altogether apart from the effects of smokeless powder. These appliances may too prove to be of merely relative value, since neither balloons, nor signalling instruments, nor moveable observatories can be brought so close to the enemy as to be able to obtain certain and valuable information concerning him. From a consideration of the proposed means of remedy to the difficulties of executive command, it does not seem as if any really effective solution had been reached. War and the great movements which compose war, present a problem which is constantly increasing in difficulty, and in the attempted solution of which, even a trifling error is not always pardonable, since it may lead to disastrous consequences. From this we may conclude that all commanders of large forces, however eminent their mental qualities, will be put to an extremely severe test in war.

We must not, however, jump to the conclusion that all direction by the commander-in-chief on the battle-field has become impossible. It is true indeed, as we have remarked before, that his action is principally through the medium of general and confidential orders (issued before the battle), in which latter it is advisable that he should explain his intentions as fully as possible, so as to compensate in some measure for his inability to control the battle effectively during the tactical phase of the action. There will then be many commanders of high rank, so placed as to be able to make their influence felt on the actual battle, who will be aware of the general intentions of their chief, and will strive for their fulfilment. Of course these secondary commanders too will be confronted by many difficulties, but it must be remembered that among the factors of victory are *troops* and *terrain*, and therefore, given troops thoroughly trained for war, given an easy working of the machinery of command, given too that each commander has rightly estimated the tactical nature of the country before him, although difficulties and doubt will be greater, and larger forces will have to be sacrificed to attain a given object; although the necessity for an acute intellect, a correct and quickly formed judgment, and a firm character, will be more apparent than in past times; yet these commanders, aided by a certain amount of information and by their intuitive powers, will be able to form a general idea of the progress of the battle. Aided by this, they will exert on the struggle a directing action on the lines of the scheme of battle adopted by the commander-in-chief. Besides these augmented difficulties will not all be on one side alone; both attack and defence will have in their turn the various circumstances of "terrain" &c., in their favour; mistakes will occur on both sides perhaps even more frequently than in the past. The important point will be to manage so that the number and importance of these errors be less on our side than on that of the enemy.

Another point which concerns the question of command is that of "marching to the guns." We have already disputed the accuracy of those who assert that the new gunpowder is silent, and we again maintain that the report of a field gun (with the new powder) though weakened, can still be heard at a distance of several kilometres. In fact the commander of an army corps would under normal circumstances be

able to hear the guns of his advanced guard opening fire, as well as the artillery of any corps on his flanks. However, it may and often has happened that a disturbing influence, such as a strong wind, or the configuration of the intervening ground, has weakened the sound waves to such an extent, as to greatly reduce their penetration in some one direction, *e. g.* against the wind &c. Misunderstandings and errors may arise from this fact. But such errors have occurred in all wars, and will occur again. They cannot be connected in any way with the introduction of smokeless powder.

(IV).—THE MORALE OF THE TROOPS.

The greater number of the authorities on this subject have seized the point, that when the new powder comes into use the soldier will be able to see more clearly the perils which he is affronting, his comrades falling, and his officers struck down, and will hear more clearly the groans of the dying and the shrieks of the wounded. Impressed with these considerations, they believe that the "morale" of the troops will in future battles be more easily lowered.

We must acknowledge that from henceforward the soldier will be put to a much harder test on the battle-field; that the latest fire-arms, which can cause sudden and enormous losses, will require troops at certain moments to show proof of extraordinary moral strength to resist the fire of their enemy; that by reason of the absence of smoke the soldier will be less bewildered, more conscious of his position and of the dangers to which he is exposed. But were the horrors of the battle-field carefully concealed from the troops in the wars of past times? Were not the supporting lines forced to pass through the wounded and dying left by their predecessors. Have the enthusiasm of the struggle and the sight of fallen comrades never incited the survivors to hurl themselves on the enemy, and awakened an ever-growing thirst for victory?

The soldier, who is generally either a peasant or villager, is inclined to listen first of all to the instinct of self-preservation; but, however great a boor he may be, he is capable too of being influenced by all the noblest sentiments of the mind, by love of his country, by respect for his superiors, by the desire of distinguishing himself, by a hatred of all that could make him appear vile and dishonourable in the eyes of his comrades. If the danger in which his life stands, and the heart-rending sights of the battle-field impress him vividly at first, yet as he advances the more clearly, owing to the absence of smoke, he sees the deadly effects of the enemy's fire on others, and the longer he remains without feeling those effects himself, the greater confidence does he acquire in his own especial good luck, and with the greater indifference does he contemplate the heart-rending scenes around him.

Besides, was not the cloud of smoke which hung all around one, which obstructed the view to the front, and facilitated a surprise, more depressing to the soldier? Will he not prefer to have a clear view over the field of fire, when he knows that he carries a weapon which can cover it in any direction with a quick succession of bullets?

This consciousness of the power of their weapons, good leadership and good example shown by their officers, the manly sentiments which

these latter may have instilled into their men, the natural enthusiasm caused by the desire of victory ;—all these factors will be as potent as in the past to keep up the “morale” of the troops, to draw them towards their enemy, and to impel them to close in hand-to-hand combat with him. Better still will it be, if the causes of the war, whether moral or political, are thoroughly in accordance with the wishes of the country as a whole, for this will tend to keep alive in the soldiers’ minds their hostile feeling against the enemy.

We must remember too, that smokeless powder, as we have already shown, will render it easier for officers to maintain fire discipline in their units ; that the soldiers will feel themselves to be better looked after and better commanded ; that finally, though there may be times and places in future battles, at which the losses may be very severe, these losses will not be suffered by one side only. These various considerations lead us to conclude, that the moral effects of the new powder will not change anything in the development of tactical action, and in the various episodes which will still mark that development as they did in the past.

This, however, does not alter the fact, that the improvement in and efficacy of modern arms will at times require well-tempered minds and self-sacrificing troops to meet them. The possession of such troops will depend on the method in which the moral training of the soldier, which cannot be hurried through, has been carried out. This moral training, commencing with instruction at home, is completed by and founded on military training in peace time. All officers therefore, and more especially those most in contact with the men, have a task of the utmost importance, and which will have the greatest influence on the result of a war. Their task will be to constantly and assiduously inculcate those noble sentiments, the germs of which are to be found in the minds and hearts of their subordinates, those sentiments which inspire a devotion to king and country, and which at the fitting moment give rise to the noblest emotions which can lead troops to victory.

Conclusion.

The problems to which the employment of smokeless powder has given birth, are a great deal more numerous than those we have considered. We have not been able to treat of them all, and even when limiting ourselves to those which seem of greater importance and which refer more directly to a pitched battle, we have been unable to exhaust our subject, much less to solve the points in question. From numerous discussions in the military press of Europe, and from the many and various opinions—some contradictory and some not altogether founded on fact—which have been propounded, we have extracted the ideas which seemed to us most conformable to the truth, and having strengthened them with what appeared to us the most valid arguments, we have expounded them to the best of our power.

It is to be noted, that with the adoption of the new powder there has arisen (as is invariably the case when any great improvement in armament is introduced) an excessive tendency to unduly magnify its

effects, to induce us to believe that such a thing as a battle will become almost *impossible*, that the battle-field will be a veritable *shambles*, and other similar exaggerations. But from the time when both sides are armed with similar rifles and use similar gunpowder, the conditions and general aspect cannot vary much, unlike those which are determined by the two constant elements of *personnel* and *terrain*.

We must repeat that the invention of smokeless powder is so recent, the trials yet made of it in camps of exercise and grand manœuvres have been so slight, our experience founded only on peace experiments is so small, that it is impossible for us to arrive at any really definite conclusions as to the modifications which it may introduce into the tactics of the future. However, close study and inductive reasoning as to possible results will never be beside the question, and may help, if nothing else, to prepare for and probably avoid unpleasant surprises due to some recently introduced factor.

Let us now briefly sum up our arguments, and the conclusions which we have thought justified.

I.—We have seen that outpost and reconnaissance duties will be more difficult, and will require the employment of larger forces: that is to say:—

(a.) Distant exploration by cavalry will be a matter of greater difficulty. Accordingly, cavalry should be highly trained in this duty, extremely dashing, and thoroughly efficient in all points.

(b.) Reconnoitring patrols should be stronger, and more generally commanded by officers.

(c.) Security of the flanks, whether on the march or in position, has acquired greater value by reason of the increased facilities for a surprise. Flank guards will have to be sent out further, and will therefore need to be stronger.

(d.) It is of increased importance that communications should be kept up between the advanced guards and the various columns on the march. This too will require stronger forces.

(e.) The nature of the country will have more influence on reconnaissance, which will be especially hard to carry out upon an extended plain affording a certain amount of cover. A correct estimate of the nature and tactical value of the country will be of enhanced importance.

(f.) The visual faculties and all which help to strengthen them, or to increase the field of vision, will demand greater attention.

II.—As regards the actual battle and the conditions under which the troops will work with reference to fire action and the perceptibility of objectives, we may lay down that:—

(a.) The conditions of fire action and discipline have been largely ameliorated both for infantry and even more so for artillery.

(b.) The ground occupied by the enemy is more clearly seen, and consequently the selection of suitable objectives for infantry fire is rendered easier.

(c.) It has become more difficult to distinguish the position of the enemy's firing line, and consequently the progress of the whole line of battle. This also applies to the choice of a distant objective by the artillery.

(d.) It is easier to see the enemy's supports advancing in rear of his firing line, and in general any bodies of troops in movement.

III.—From these facts we may deduce :

(a.) The increased importance of any cover afforded by the ground, both for infantry and artillery.

(b.) The necessity of employing the least vulnerable tactical formations, and of making the utmost use of cover, especially in the case of troops in rear of the firing line.

(c.) The increasing difficulty of knowing one's exact position during the battle and of taking a clear view of the situation at any given time.

(d.) The increased necessity of keeping in communication with adjacent bodies of troops.

(e.) The increased value of artillery and of its intelligent employment.

(f.) The greater difficulties in the way of cavalry action during the battle.

(g.) The lengthening of the opening stages of the battle, during which stronger forces than were formerly deemed necessary will have to be employed.

(h.) The increased value which during the the entire duration of the battle, will be attached to a prompt and correct estimate of the tactical features of the ground.

IV.—We saw in our discussion on attack and defence, that the latter is most benefitted by the improved conditions of fire action, but that the offensive can reckon on the support of material and more specially moral factors, which more than counterbalance this advantage.

V.—Referring now to the conditions of the executive command, we found that they would be affected greatly for the worse, and we noted the following points, *viz.*, a marked deficiency of specific information, especially in the first stages of the battle ; a prolonged uncertainty as to the right measures to be taken ; a greatly lessened influence and power of action upon subordinate commanders ; in short, greater difficulties in the carrying out of the duties appertaining to the commander-in-chief. And on this point we considered the questions of (a.) the importance of possessing a cavalry arm thoroughly trained to reconnaissance duty ; (b.) an increase in the "personnel" of the headquarters staff. (c.) The increased power of initiative necessarily to be left to the discretion of subordinate commanders. (d.) The necessity of having numerous reserves, that is reserves destined to be used as fighting lines. On the whole question we concluded, that although the duties of the chief control in action will be more arduous, and will require especially commanding qualities of mind and character, yet these duties can and must nevertheless be carried out with useful results.

VI.—We next considered the influence of smokeless powder on "morale" and whilst recognising that at certain moments in an action the troops will require heroism rather than mere courage to stand firm under fire, we were unable to admit that "morale" will suffer much from the absence of smoke.

We were rather of opinion that the "morale" of troops, in future as in past wars, will depend on their training in peace time; on the material and moral state of preparation of the army, and on the moral and political aspects of the war in which it is engaged.

Now what shall we put forward as the definite conclusion to be drawn from the various points we have discussed in this short sketch? Briefly this, that smokeless powder (together with the latest improvements in fire-arms, which will soon be universally adopted) does not cause any radical change in the art of war, but vastly increases its difficulty, and this applies to the troops, to subordinate commanders, and to the commander-in-chief of an army.

The army which is most thoroughly convinced of the truth of this statement, and which therefore displays the most continuous zeal in the study of the art of war; which has most thoroughly trained its men in mind and character to stand the hardest tests; and which has filled every post with the most capable and efficient men, will have the best chances of success.

Let us hope therefore that our army, mindful that study in peace time means victory in war, will bend all its energies to the task, and will acquire such strength, as to always prove a formidable opponent on the battle-field.

INSTRUCTIONS FOR FIELD FIRING OF DETACHMENTS OF THE THREE ARMS OF THE RUSSIAN ARMY. 1886.

Translated by Captain R. C. ANDREWS, Indian Staff Corps, D. A. A. G.,
for Musketry.

Object of the Exercise.

SECTION 1.—Field firing has for its object the instruction of the different arms of the service in combined manœuvring, under circumstances as much as possible resembling actual warfare.

Composition and dimensions of bodies of troops for field firing.

2.—Field firing is carried out amongst the troops on the active list of the army, in such a manner, that each corps shall have taken part in each manœuvre at least once.

3.—Detachments for field firing consist of one battalion of infantry, nearly of war strength, one field battery of eight guns, and one or two squadrons of cavalry, with a horse artillery battery of six guns.

NOTE.—The composition of detachments for field firing as above may be enlarged in those places, where, owing to local circumstances, it may be possible to do so.

4.—In order to approach war strength, companies taking part in field firing are composed of two companies of peace strength, in this case each of the latter represent a half company. In this manner two battalions of peace strength take part in one exercise of field firing.

NOTE.—Those portions of the army having an increased number of the superior ranks during peace time, may take part in field firing in their actual strength.

5.—The following proceed to field firing with the detachments mentioned in para 3, viz. two ammunition carts for a battalion of infantry (one for each two companies), one ammunition cart for a squadron of cavalry, and the first echelon of ammunition waggons for the artillery, or limbers in their place when the former are not available.

6.—Ambulance carts are also sent out for field firing, one for each body of troops of each arm; these must be accompanied by doctors and apothecaries.

7.—The rank and file attend field firing in full field service order with their kits in their knapsacks. As regards the number of rounds they are to carry, vide below, section 24.

Selection of sites and dimensions of ground necessary for field firing.

8.—In the selection of sites for field firing it is necessary to have in view, that the performance of the exercise on the piece of ground selected should not endanger surrounding inhabited points.

9.—The dimensions of ground selected for field firing of detachments of the strength laid down in section 3 must be not less in length than six versts (4 miles), counting from the first artillery position, in one direction, and in breadth not less than two or three versts ($1\frac{1}{2}$ or 2 miles.)

Tactical instructions for detachments taking part in field firing; general conduct of the manœuvre, and fire problems.

10.—As a basis for the tactical instructions given to troops taking part in field firing, we may take into account both the offensive and defensive, although the former is more instructive, for in that case instruction in field firing is accompanied by practice in the simultaneous manœuvring of troops of various arms. In other respects it is not necessary to enter into complicated suppositions at such manœuvres.

11.—Fire problems are worked out some days before the practice on the actual ground, conforming to the tactical instructions given to the troops, and adapted to the orders given on the subject in the "Instructions for the operations of detachments of all arms on the battlefield", and "The Musketry Regulations."

These problems are worked out by persons nominated for the general conduct of the whole manœuvre (hereafter called Chief Umpire), and are communicated confidentially, only to the special officers nominated as umpires to each company, squadron, and battery, taking part in the exercise.

12.—The time allowed for firing at the targets is determined in accordance with the supposed circumstances of the battle on which the determination of the problem depends, with this consideration in addition, that the targets should not be subjected to fire for a longer period of time, than that during which the objects represented by them would be able to remain exposed in actual warfare.

13.—The umpires communicate the fire problem proposed to the commanders of those divisions of the force to which they are attached, and the sections of ground told off for each commander; and to the latter, by degrees, as they attain a certain spot, they point out which targets are exposed, either for a period of time only known to themselves, or during the whole period necessary for passing over a certain space of ground during the attack.

NOTE 1.—Thus for instance during the attack, on arriving at an assigned spot, the umpire informs the company commander, that the enemy's firing line (denoted by a certain group of targets) has opened fire; during the interchange of fire with the enemy's firing line, either when halted or during the advance, he informs him, we will suppose, that besides the firing line a company column is also visible (denoted by another group of targets); after this perhaps the firing line is hidden by a fold of the ground, and at a distance appears, for instance, the enemy's artillery approaching a position, and so forth. In the above example the company is given three consecutive fire problems.

NOTE 2.—In exercises of a defensive character, the umpire in exactly the same manner, shows the company commander the targets representing the task set, but in this case all fire problems are determined from one position.

14.—The umpire having, at a certain spot, communicated the task set to the commander of that portion of the force to which he is

attached, only points out to him the targets assigned, but does not define the time fixed for the duration of fire at such target. After that, following the time with a watch, he informs him, on the expiration of the time assigned, that the target is hidden, although troops may not have succeeded in firing a single round.

The periods of time allowed for firing at the objects might be, for instance, not more than 10 to 15 minutes for artillery, and under certain circumstances even three to five minutes; not more than two to five minutes for musketry fire at objects representing close order formations, and in addition at distances not nearer than 600 to 800 paces (not counting in this calculation the time taken for bringing up the reserve to the firing line, on those occasions when it is necessary to carry out the firing by the firing line and reserve combined); not more than one minute for meeting a cavalry attack. The rapid firing from the last position before the bayonet charge, continues during the whole time of the movement of the reserve up to the firing line.

NOTE.—In the problems given to umpires it is not advisable to define too exactly the space of time assigned for firing at the objects, but to allow a certain amount of freedom in this respect. For instance, from 12 to 15 or from 3 to 5 minutes. In this case, if the umpire is persuaded that the objective is quickly overwhelmed with fire, he stops the firing on the expiration of the lesser limit of time assigned for carrying out the problem; if the carrying out of the problem is delayed on account of unsatisfactory fire or for other reasons, he can prolong the determination of the problem to the furthest limit of the time assigned.

15.—The rule published in the preceding paragraph regarding the procedure for carrying out fire problems is applicable to troops of all arms. Moreover, from the time assigned for carrying out the problem it is necessary to deduct the time taken to communicate the problem by the umpire.

16.—Problems for field firing (fire problems) need not be apportioned invariably to companies, they can be assigned to different bodies of the manœuvring force, and in accordance with the supposed conditions of the fight, the firing at the objective may be entrusted to several companies.

Preliminary arrangements for field firing.

The general arrangements for carrying out field firing by detachments of the three arms must proceed from the commanders of districts, who also make the preliminary communications with the local administration for the allotment of the portions of ground required.

18.—The commander of the force having inspected the site allotted for the manœuvre, determines the composition of the force intended to take part in the exercise, and its commanders.

NOTE.—The commanders of detachments for field firing are nominated from among the commanding officers of troops of the various arms.

19.—For the purpose of making out the general "idea" for the conduct of the manœuvre, as well as for the closest supervision of the manner of its performance, the commander of the force nominates "Chief Umpires", chosen from among the generals or senior staff officers of infantry, cavalry, and artillery.

20.—To aid the Chief Umpires, assistant umpires are also appointed, one for each company, squadron, and battery, for the purpose of pointing out the problems set, and making remarks on the manner in which they are carried out.

For bodies of infantry and cavalry, umpires are selected from among the senior officers of corresponding arms of the service from among those parts of the force not taking immediate part in the exercise.

21.—For the purpose of co-operating with the chief umpire in drawing up the general idea, as well as for noting down the remarks made by him during the progress of the exercise, a special officer of the general staff is placed at his disposal. At the time of the exercise, several orderly officers and a staff bugler of infantry and one trumpeter, each from the cavalry and artillery, are placed at the disposal of the officer commanding the manœuvring force.

22.—For the general supervision of the preparation of the position a special officer is appointed, who supervises the erection of screens, in concert with officers well acquainted with the several arms, from the cavalry and infantry detachments taking part in the manœuvre, and a special officer from the artillery.

23.—From one to two squadrons of cavalry, with the proper complement of officers, are told off for the purpose of forming a cordon round the site selected for field firing. The actual disposition of this cordon before the commencement of the manœuvre, and in accordance with the orders of the Chief Umpire, is entrusted to an officer of the general staff specially nominated, who carries out the arrangements in co-operation with the officers of the detachments forming the cordon.

24.—The rank and file of the infantry taking part in field firing are provided with service ammunition at the rate of 12 or 15 rounds per man, according to whether they are served with the old or new pattern of packets. A similar number of rounds per man must be carried in ammunition carts. In the cavalry 12 rounds per man, and as many per man in carts.

NOTE—Those portions of the army which are on the list of the active army for the present year, and are consequently obliged to carry out field firing, will not perform during the year the two exercises of the annual course of target practice laid down in the musketry regulations in the infantry; and one such exercise in the cavalry, as well as that at the disposal of the commanders of forces for various other purposes, will be used for field firing.

25.—Field artillery batteries will be served with from 70 to 100 rounds for field firing. Of these one-third will be common shell and two-thirds shrapnel. Horse artillery will also be served with ammunition at the above computation, viz. 8 to 12 rounds per gun.

NOTE—Forty rounds for field firing must be retained in each battery out of the number of 421 rounds assigned for the practice of each battery in the new "instructions for the practice of field batteries." The remainder of the rounds required, from 30 to 60, is issued on special indent.

26.—A special officer is told off to every ammunition cart employed at field firing, who notes every issue of ammunition, in lieu of that expended during the practice, i. e. he writes down the number of rounds issued, and the designation of the portion of the troops to which issued.

This information be presents to the umpire at the end of the exercise for comparison with the number of rounds expended.

27.—In the first place, the execution of field firing is useful in making officers of infantry and cavalry acquainted with the different aspects of artillery fire, and vice versa, artillery officers with the fire of infantry. For this purpose artillery officers will, under the orders of the commander of the district, attend the field firing of the infantry, and if the head-quarters of the force is near the artillery polygon (ordnance dépôt), the former officers will attend artillery field firing.

28.—The day appointed for the execution of field firing must be communicated in good time to the local civil authorities, both for the purpose of warning the surrounding inhabitants, and to enable the former to take all necessary precautions for safety.

In connection with this, it is necessary to remind them to warn the local residents, in order to obviate unfortunate accidents, that they should not touch any unexploded shells if any be found by them.

Inspection of the site selected for field firing, and the preparation of the position.

29.—Several days previous to the exercise, the Chief Umpire together with the officers told off as umpires to companies, squadrons, and batteries, and also the officers detailed for the preparation of the position, will make a detailed inspection of the site, with a view of preparing for the working out of the general idea, the scheme for carrying it out, and the problems of fire tactics.

30.—During the inspection it is necessary to search out all the slopes of ground which present suitability for artillery and infantry positions, both for the commencement and further development of the fight, offensive and defensive. In all positions thus selected, they will note by eye positions suitable for the erection of targets under conditions of safety from fire.

31.—Bearing in mind that even in battle the whole fighting formation of the enemy does not show itself at one time, it is necessary at field firing, to place the targets so that, in accordance with the advance in battle order, they should be partly concealed by local irregularities of ground or natural cover, and part remain in the open.

32.—For the purpose of carrying out fire problems with musketry fire on screens representing artillery or considerable bodies of infantry and cavalry, in the open or concealed, the screens should be placed not nearer than 1,000 paces. For carrying out fire problems, when advancing to the attack by rushes, and up to the preparation for the attack by fire from the final firing position, screens should be erected simulating the fighting line of the enemy at distances from 900 to 200 paces.

33.—In the erection of screens for artillery fire, one may take into consideration artillery action (during the attack) from three positions, (1st), the long range fire on artillery or on closed bodies of infantry and cavalry, (2nd), the overwhelming of the enemy's artillery fire, (3rd), the final preparation for the infantry attack. Besides these, on the occupation by the infantry of the last position attacked, the artillery

should advance to a fourth position for the pursuit of the retreating enemy.

NOTE.—Concerning the distance at which screens for artillery fire may be erected, it is necessary to be guided by the rules laid down in the "Instructions for the conduct in battle of bodies of troops of all arms."

34.—In selecting positions or places from which it is intended to carry out fire problems by bodies of infantry or dismounted cavalry, it is necessary to regulate the battle formation in such a manner, that the portions of troops adjacent to the artillery should be placed at an interval of not less than 200 to 300 paces from the line of fire of guns on the extreme flanks.

35.—The number of screens used for field firing are put up by the cavalry and infantry taking part in the exercise. If the exercise takes place near an ordnance depôt, the setting up of screens representing artillery may be entrusted to the artillery corps.

Targets that have been fired at previously may be utilised, but it is necessary in this case that they should be well covered and painted.

The regulation colour for painting screens, unless they have figures, is grey.

36.—With a view of decreasing the expense of preparing screens for field firing, the number of targets laid down for the representation of various warlike objects, Sec. 203 Musketry Regulations, may be decreased; for example, to represent a company in close order, four targets, number two, placed in line, may be used.

A company deployed at one pace interval may be represented by 25 targets, standing or kneeling figures, placed at one pace interval; in addition, there should be an interval of about 100 paces between groups of targets representing company firing lines. Guns and their limbers, (unless made up by artillery) are represented by two targets, No. 2; moreover the targets representing limbers may be placed either straight behind those representing the guns or to one side, looking to the fact of where the limber would be placed in actual warfare in accordance with the local circumstances of ground. An attacking squadron of cavalry must be represented by three targets, No. 2, placed on their sides, and at a slope in accordance with regulations. For the representation of a squadron at the halt, at a distance, 6 to 8 targets, No. 2, must be used, placed on their sides. In addition, to represent single individuals it is necessary to use targets, heads, heads and shoulders, and full length, placed in accordance with the idea in view and configuration of the ground, but preserving as exactly as possible the above mentioned dimensions of ground occupied by the supposed parties of the enemy, and the same intervals.

NOTE.—Targets intended for artillery fire require firmer supports than those for musketry fire.

37.—Each group of targets is denoted by flags, using flags of one colour for marking out those groups of targets, intended to be fired at by a certain branch of the force, or certain part of the troops engaged. The fire problems are distinguished by the number of flags exposed.

The dimensions of the flags should be such as to be easily visible from a distance.

38.—In arranging the targets, they should be given a definite appearance of battle order, answering to the composition of the attacking force. The targets are placed fronting the probable line of attack upon them, and marks to be fired at by artillery are put in position fronting the probable artillery position. If it is possible to make use of bombs, then the targets representing the extended lines may be placed in bushes concealed from view. The fire of artillery may also be simulated by such bombs.

39.—For the disposition of the targets, positions are selected one behind the other to be occupied by the firing line, supports, reserves, artillery or screens representing cavalry attacking or attached to the reserve.

The screens should be placed, as far as possible, with such intervals from front to rear between the parts in battle order, that bullets directed on one target should not pierce the next.

40.—Screens representing extended lines are arranged, conforming to the ground, in distinct groups for the firing lines of each company; being composed of targets, heads, heads and shoulders, and full length, or of all three kinds, with the representation in their proper places of the commanders of the line (standing or kneeling). Flank targets are placed slightly at an angle from the front to show the possibility of firing on a line with its flank thrown back.

41.—If the ground permits, besides the frontal direction of fire (along the site), the election is permitted during the advance or retreat, of another direction of fire, not dangerous to the surrounding neighbourhood or the cordon keeping the ground. Then it is useful to place targets representing a flank attack on the part of the enemy against the manœuvring force, or a disposition to meet a flank attack by the latter. In placing such targets it is permissible to take advantage of all local cover, so that the discovery of the situation of such targets should be as far as possible accompanied by surprise.

42.—In the disposition of targets behind local cover or earthworks, for the determination of problems by indirect fire of infantry, the limits of the ground occupied by the concealed targets should be shown by two flags placed on the summit of the height behind which the screens are placed.

Duties of Umpires.

43.—The duties of officers appointed as umpires to companies, squadrons, and batteries, are as follows:—

(1.) On the day before the manœuvres and after the targets have been put up, they traverse the whole of the portion of ground told off for the manœvre, and note those places from which must be decided the fire problems of the portions of the troops to which they are attached.

(2.) On joining the detachments to which they are detailed as umpires, they verify and note, before the commencement of the operation, the number of rounds in the pouches of the men, cavalry and infantry, and the number of rounds with batteries.

(3.) Without informing beforehand the commanders of the bodies to which they are attached, of the details of the manœuvre, known to themselves, as to the conditions under which the problems will be carried out, they notice whether these bodies preserve a true direction on those points on which they will have to fire; this is especially important when moving over intersected country.

(4.) At certain points previously determined upon, they inform the commanders of the detachments of the fire problems intended, and point out the targets to be fired at, stopping the firing on the expiration of a period of time known to themselves alone, being guided by para. 14 of the present instructions.

(5.) Without interfering with the dispositions of the commanders of detachments or in their operations in carrying out the problems etc., umpires confine themselves to noticing all that goes on in their presence, and taking notes in the tables supplied (appendix I.) of necessary data, as for instance, elevation used, description of fire, time occupied in firing, number of volleys, etc.

Umpires with artillery carry out the above instructions, noting on their tables (appendix II.) all circumstances attending the carrying out of each problem.

NOTE.—Interference on the part of the umpire in the actual method of deciding the problem can only be permitted in case that the dispositions of the commander of the detachment should extend the action of his command beyond the limit of the problem set him, and thus interfere with the general dispositions for the manœuvre.

(6.) On the conclusion of the fire on the object indicated, the umpire informs the commander of the detachment whether he supposes the enemy is beaten and has taken cover, or whether it is necessary to charge them with the bayonet.

(7.) Umpires take care that the rank and file do not fire at targets other than those pointed out to them, and also that on nearing the targets during the attack the firing should be entirely stopped at 200 paces, unless it is necessary to fire at the firing line at such a distance for the preparation of the bayonet charge.

(8.) On the conclusion of the operations the umpires count the number of rounds remaining in the pouches of the men, and deduct the result from the total number of rounds, consisting of the number of rounds in pouch before the commencement of the operation together with the number issued from the ammunition boxes. They obtain information of the latter from the officers superintending the issue of reserve ammunition during the conduct of the manœuvre. After this, umpires count the number of hits on all the targets fired at by their party, and at the same time they measure the actual distance to the target from those spots at which firing took place, and note in the tables the number of rounds fired, hits, and distances to the objects. Artillery umpires perform the same duties, counting separately the piercing of targets by whole shells, splinters, and lastly shrapnel bullets.

(9.) On the completion of the notes in the tables of everything required, umpires present these tables to the Chief Umpire of the whole manœuvre.

Duties of Chief Umpire.

44.—Having inspected in detail the site selected for the manœuvre, and having prepared the positions, which would be occupied by the imaginary enemy, in accordance with the idea whether he is supposed to be acting on the offensive or defensive, the Chief Umpire performs the following duties :—

(1.) Composes the general idea and scheme for the method of conducting the proposed exercise, and presents both for the approval of the commander of the force.

(2.) Defines the problems of field firing which are to be determined during the manœuvre, apportioning them to the different divisions and detachments of the force taking part in the operations, and at the same time naming places and times for their performance.

(3.) Defines the space of time (from how many to how many minutes) for the firing on the objectives for the determination of fire problems.

(4.) Gives detailed instructions to the officers superintending the erection of the targets concerning the order of their erection ; when this is completed, satisfies himself by personal inspection of the exact fulfilment of his orders.

(5.) Computes the number of dummies, flags etc., to be prepared by each portion of the force taking part in the manœuvre.

(6.) Lays down the time and place at which the number of targets ordered are to be delivered, also the numbers of working parties, entrenching tools, and carriage necessary for preparation of the position.

(7.) Defines the number of men necessary as a guard to the screens etc., until the arrival of the detachments told off to keep the ground.

(8.) Defines the limits for and order of posting the cordon for keeping the ground, and also how many men should be sent out, whither, and at what time.

(9.) Determines the number of working parties which should be sent out at the end of the operation for picking up empty cases and dropped cartridges, in infantry and cavalry, and also the number of the artillery detachment with an officer, for the collection after the exercise of shells which may have remained unexploded.

(10.) Determines the number of working parties and carriage necessary to carry away the screens &c., at the end of the exercise.

The plans made by him for the above mentioned points (5 to 10) are reported by the Chief Umpires to the commander of the force, for him to make the necessary arrangements.

During the whole time of the operation the Chief Umpire remains with the commander of the force, observing the direction and manner of carrying out the manœuvre in accordance with the scheme, and ordering the officer of the general staff attached to him to make notes of the results of his observations.

At the close of the manœuvre the Chief Umpire enters all the information from the tables presented to him by umpires, in a general report (App. III.), which he gives to the commander of the force as a general estimate of the active efficiency of each portion of the force taking part in the manœuvre.

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Orders for carrying out the manoeuvre.

48.—As a preliminary to carrying out the tactical problem laid down for the force, it must first perform a march as if in the field, with all service precautions, for a distance of about half the march to the ground.

At a distance of two or three versts from the spot where the manoeuvre will begin, the force concentrates, and the Chief Umpire communicates the general and special ideas to the commander of the force. The commander of the force communicates the general idea only to the junior commanders, and then gives the necessary orders. From this time officers detailed as umpires to the units of the force attach themselves to those units.

The manoeuvre begins with the supposition that the cavalry has already carried out a reconnaissance.

49.—After the commander of the force has made the preliminary dispositions, the force, having sent on an advanced guard, continues its movement in order of march. The commander of the advanced guard having discovered the enemy (represented by screens), extends the advanced guard in battle order, and continues the advance, and relieves the cavalry in front (if they have been given a fire problem to carry out). After this the different portions of the advanced guard carry out the problems previously ordered for them.

The advanced guard, in accordance with the problem given, may as a preliminary entrench itself and carry out some problems of a defensive nature; after this on being relieved or reinforced, it either marches off where ordered, or continues the attack.

50.—On the extension of the force in fighting formation, the general attack commences; during which, in accordance with the problems communicated by the umpires, the screens told off for the various experiments are fired at.

51.—When the sections are extended in the firing line, it is absolutely necessary to preserve the intervals between them in accordance with para. 241 of the field exercises. These intervals give those commanding the firing line the opportunity of superintending more efficiently all men who may fall under their command, and the lower ranks are enabled to understand more rapidly exactly whose command they should obey on the reinforcement of the firing line and the possible mixing up of sections in consequence.

52.—In advancing by rushes at field firing, it is advisable to advance in considerable bodies, for example, half companies or even whole companies, bearing in mind which seems the most advisable.

53.—The commanders of units adjacent to the artillery must take care that the flanks of their units do not approach nearer than 200 to 300 paces from the line of fire of the gun nearest to them.

54.—As they approach the enemy's positions, represented by screens, some of the former may be occupied without the bayonet charge under the supposition that the enemy has evacuated them without waiting to receive the attack; other positions are taken by the bayonet charge, in

which case the storming parties must invariably rush through between the targets, and having taken the position attacked, immediately form up for carrying out the pursuit with fire or for meeting a counter-attack. The umpires must inform commanders whether it is intended to carry out the bayonet charge or occupy the position without a charge, but only on arriving at the last position from which the preparation for the attack with rapid firing takes place.

55.—On moving forward at the charge from the last firing position, on the charge being sounded (approximately 200 yards from the enemy), and when the reserves have already joined the firing line, firing must be stopped.

Both before the charge and before every rush of the firing line, it is necessary to give the command "unload."

56.—Company, (squadron), and section commanders must practise the use of the whistle at field firing, to accustom the men to turn their heads towards their commanders on hearing the whistle for the quick and exact reception of orders.

57.—Non-commissioned officers carry out the same duties at field firing as they do in actual warfare, *i. e.*, watch and conduct the actions of those under them; they do not fire at all themselves.

58.—Immediately on the formation in battle order, the ammunition carts must attach themselves to the companies of the battalion reserve. When it is necessary to fill up the pouches, the commanders of companies of the advanced line send information of this to the battalion commander with men from their own supports, the rest of the supply of ammunition is carried out in accordance with the orders on the subject.

When expedient, the issue of ammunition to the cavalry is carried out in a similar manner to the above. In this case men are told off from the reserve, with which the ammunition carts are, to issue cartridges to the firing line under arrangements made by the commander of this reserve. The issue of ammunition to the artillery is arranged for by the commander of the battery.

59.—In case of any interruption during the manœuvre, or generally, if necessity arises from any cause whatever to stop the advance, the Chief Umpire sounds the call "All," and then "Halt." On this signal being given, all the units taking part in the manœuvre at once cease firing, and halt on the spots at which the signal found them, waiting for further orders. Commanders of units in cavalry and infantry immediately give the command to unload. Guns not already fired remain loaded.

60.—On the occupation of the enemy's last position, the cavalry may be brought forward to pursue the enemy. In this case, immediately on the appearance of the cavalry at the firing line, the fire of the latter must cease. After this, the cavalry carry out the attack by galloping in between the screens representing the retreating enemy.

61.—At the conclusion of the manœuvre, the cordon keeping the ground is not to be removed, until all unexploded shells (should there be any) have been taken away. For the collection of these a special artillery party under an officer is detailed.

NOTE.—Before the commencement of the manœuvre it is necessary to warn all the troops not to touch unexploded shells if they should find any, and especially the working parties sent out for picking up empty cartridge cases and cartridges, and for taking away screens.

62.—Immediately after the conclusion of the exercise, the parties told off for collecting the cartridge cases, under the orders of the Chief Umpire, traverse in extended order the whole site, and carefully remove the empty cases and cartridges thrown away.

At the same time also the artillery party is sent out to collect unexploded shells. After this the working parties specially detailed take up and carry away the screens.

63 —On the conclusion of the exercise all information concerning the way the problems of field firing have been carried out (App. III.) is communicated by the Chief Umpire to the senior commander present at the manœuvre, who, on the basis of this report, as well as on his own observations during the operations, gives a general criticism of the operations to all parts of the force.

NOTE.—*The following are the dimensions of regulation targets :—*

	<i>Breadth.</i>	<i>Height.</i>	<i>Remarks.</i>
No. 1,	1 ft. 3 in.	5 ft. 10 in.	{ White bar d. 1/2 in. centre 1 ft. 6 in. broad.
„ 2,	8 ft. 9 in.	5 ft. 10 in.	
<i>Full length figure</i>	1 ft. 6 in.	5 ft. 10 in.	
<i>Head & shoulders.</i>	1 ft. 6 in.	2 ft. 11 in.	
<i>Head only.....</i>	1 ft. 6 in.	1 ft. 6 in.	

Appendix I.

FORM OF TABLE FOR REMARKS BY UMPIRE.

3rd combined company of the 132nd (Bendersk) Regiment of Infantry (5th and 6th companies); Company Commander, Captain Petroff. Strength, 5 Officers, 23 Non-Commissioned Officers, and 160 Privates. As a company advanced guard.

Denomination of problem, and information for the conduct of the operation on communicating the problem to company commanders.	Elevation used.	Actual distance.	Description of fire and size of units firing.	Duration of fire.	Number of hits.
Problem V. (One yellow flag). The enemy's firing line covers the retreat of an advanced body with rapid fire. The problem is to be communicated as soon as the company has passed the position of a line of dismounted cavalry. Firing from the first position presenting itself to continue for three minutes; then to commence advance by rushes, firing on the firing line, and on arriving at a place pointed out by the umpire, to communicate problem VI, not stopping the firing on the enemy's firing line. After carrying out problem VI to continue the rushes and firing on the firing line; at 200 paces from the position of the enemy's firing line to halt and open deliberate fire, and when the reserve has arrived at 200 paces from firing line of company, open rapid fire; and at the expiration of 3 minutes to communicate that the enemy's firing line has abandoned the position, which can be taken with bayonet charge. Immediately on occupation of the position to communicate problem VII.	900 to fixed sights.	950 to 210.	Deliberate independent firing by two sections, and from the last position rapid firing by 3 sections of firing line.	During the advance by rushes and from the position, 4 minutes.	48
Problem VI. (3 yellow flags). From 2 to 3 minutes. A support retreating is in view. Firing may be carried out by sections in the firing line, or by sections from the reserve of company or by both together. For this reason the umpire must warn the company commander (calculating the distance to the reserve) 2 or 3 minutes beforehand that opposite the position of the firing line troops in close order are visible. The problem is to be communicated on the approach of the reserve, if this is called up by company commander.	1000. Afterwards 900.	975	Independent by one section of firing line, and volleys by two sections of company reserve.	2 minutes.	50
Problem VII. (2 yellow flags). From 4 to 5 minutes. A column in close order is visible retreating by a cross road. The problem is first carried out by the firing line, and when the reserve comes up, by the whole company.	1200. Afterwards 1300. Afterwards 1400. 1800	1470	Independent by whole firing line, and volleys by company reserve.	5 minutes.	In conjunction with the 4th coy. 80 hits.

Signature of Umpire.
LIEUT.-COLONEL SERGATOFF.

Issued to 160 men, 12 rounds each = 1920 rounds.
Received from ammunition cart 600 rounds, or total 2520 rounds. 540 rounds remained with the men of the company. Total rounds fired 1580. Hits 98. Besides this there were 80 hits on the target fired at in conjunction with the 4th coy.

Appendix II.

FORM OF REGISTER FOR SIGNATURE OF UMPIRE.

Combined battery from the establishment of 4th & 5th Light Artillery Brigades. Commander of battery, Colonel Ivanoffsky.
Strength 8 light guns.

Denomination of problem, and information for the conduct of the operation on communication to the Battery Commander.	Height of elevation in lines & paces. Time of flight for shrapnels.	Actual distance.	Character and number of projectiles.	Time occupied in firing from communication of problem.	Results of fire.	Notes. 1 Time taken in opening fire from communication of problem. 2. Duration of fire. 3. Selection of projectiles. 4. Particular circumstances.
Problem VIII. (2 white flags). (4 guns represented by 8 targets No. 2 in two lines in accordance with the musketry regulations.) The enemy's battery has opened fire. (From 12 to 15 minutes.) Problem to be communicated when the battery has approached the position selected by battery commander. At the expiration of the smaller limit of time, to communicate the idea that infantry having got in front of the battery, has begun to mask the objective, and at the end of the longer limit of time to state that the objective is entirely masked and that firing must cease. After this, the battery stays some little time in the same position on the supposition that it is firing at some other objective, and when the firing line of infantry attains a spot determined by the umpire, to order movement to a fresh position.	Common shell 32 lines. 1140 Sajsens. Shrapnel, 23½ lines, 7¼ seconds.	1150	Shell, 11. Shrapnel, 21.	14 minutes.	Whole shells, 2. Splinters, 211. Bullets, 300. Disabled, 2 guns. Limbers, 1.	(1) 1½ minutes. (2) 4 do. (3) Suitable. (4) one shell burst at the muzzle, and 2 shrapnels burst prematurely and far in front of objective. 1 shell and 1 shrapnel did not explode.
Problem XVI. (4 white flags). (4 guns represented by dummies.) Taking up a new position for the purpose of silencing the fire of enemy's guns. (From 7 to 8 minutes.) The problem to be communicated on approaching the position. At the expiration of time allowed, to communicate problem XVIII. from the same position; in the meantime it is permissible to fire a salvo on the artillery, so as to unload the guns before the shells are brought up for firing on the new objective (problem XVIII.)	Common shell 12½ lines. 690 Sajsens. Shrapnel 12½ lines, 3-2 seconds.	650	Shell, 7. Shrapnel, 22.	1½ minutes.	Whole shell, 2. Splinters, 210. Bullets, 239. Disabled, 1. Limbers, 2.	(1) 1 Minute. (2) 2 do. (3) Suitable. (4) 1 shell did not explode.
Problem XVIII. (3 white flags.) In view troops in close order. The battery after conclusion of this problem remains in its place, and afterwards follows up the attacking party, and after the occupation of the last position moves off in pursuit.	Shell 7 lines. 400 Sajsens. Shrapnel 7 lines, 2 seconds.	420	Shell, 5. Shrapnel, 15.	3 minutes.	Whole shell, 1. Splinters, 142. Bullets, 318.	(1) From the same position without cessation. (2) 1 minute. (3) Suitable. (4) Did not observe any.
Problem XX. (Various flags and all the targets representing retreating enemy.) Pursuit with the fire of the enemy beaten out from earthworks and woods (3 minutes). Having called the battery up to the position, to inform when the infantry has appeared on the position attacked, and after taking up the new position, to communicate the problem, should the direction of fire not be dangerous to surrounding places in case of ricochets of unexploded shells.	Point blank.	175	Shell, 8. Shrapnel, 8.	3 minutes.	Splinters, 40. Bullets, 212.	(1) 1 minute (2) Nil. (3) Suitable as the battery arrived with guns loaded with shells. (4) 1 Shrapnel did not burst.

Total expended = shells 31, shrapnels 66. Results, whole shells 6, splinters 603, shrapnel bullets 1069. Disabled, 3 guns, 4 limbers.
Average rapidity of fire per battery 60 and per gun 60; direction of fire was frontal.

* 1 line = $\frac{1}{10}$ of an inch

Signed. IVANOFF, Colonel.

Appendix III.

REPORT

of the results of field firing of infantry, cavalry, and artillery carried out in the presence of.....

August.....18.....

Denomination of problem and parts of fighting formation engaged.	What portion of force fired.	Elevation. F = fixed sights. 1,000 two elevations. 900 = tions.	Actual distance.	Size of firing units, description of fire, and in artillery kind of projectile.	Duration of fire.	Hits.
A.						
Occupation and defence of a height by dismounted cavalry until arrival of the infantry.	36th Dragoon Regiment of Achinsk.					
PROBLEM I.—(on 3 particoloured flags); (two groups of extended lines, heads, and head and shoulders). Enemy's line has opened fire. Time unlimited.	Dismounted portion of 1st squadron. Ditto 5th squadron.	1,100; after, 800 to F. 800; after, 900 to F.	700 to 200. 850 to 170.	Two sections deliberate, independent; afterwards rapid fire to occupation of position. Shells 11. Shrapnel 20.	At the halt 5 minutes, afterwards during rushes. 6 minutes.	21. 32. Whole shells, 2. Splinters, 41. Bullets, 93.
PROBLEM II.—(1 white flag) Infantry in close order are in view (5 to 6 minutes.)	Horse Artillery. „ Battery.	800.	700.			
PROBLEM III.—(two particoloured flags); (two sets of targets each of three targets, No. 2.) Enemy's supports have come in view (from 3 to 4 minutes); after that occupation of the position, and problem IV.	Dismounted bodies of, 1st squadron. 5th squadron.	900. 1,000 900	950. 1,000.	Rapid independent from firing line, and volleys from reserve.	4 minutes.	13.
PROBLEM IV.—(one particoloured flag); (two groups of extended lines, heads only.) Enemy's firing line prepares for the charge with rapid fire.	As above—1st squadron. 5th squadron.	Fixed sights. 400.	320. 300.	Deliberate independent & rapid firing by 2 sections per squadron.	3 minutes.	27. 18.

APPENDIX III—(Continued.)

Denomination of problem and parts of fighting formation engaged.	What portion of force fired.	Elevation. F = fixed sights. 1,000 — two elevations. 900 =	Actual distance.	Size of firing units, description of fire, and in artillery kind of projectile.	Duration of fire.	Hits.
B.						
Advance of infantry of the advanced guard, and relief of cavalry.	132nd Regt. of Bendenski; combined companies of the 2nd battalion.					
PROBLEM V.—(one yellow flag); (two groups heads and shoulders). Enemy's firing line covers the retreat of the advanced bodies with rapid fire. (Time unlimited).	3rd company (Nos. 5 and 6). 4th company (Nos. 7 and 8.)	900 to F. 1,000 to F.	950 to 210. 900 to 250.	Deliberate independent by 2 sections per company, and from last position rapid fire by 3 sections of company.	During advance by rushes from last position, $\frac{3}{4}$ minutes.	48. 43.
PROBLEM VI.—(3 yellow flags); (two sets of targets of 2 targets No. 2.)	As above— 3rd Company.	1,000; afterwards, $\frac{900}{800}$	975.	Independent by 1 Section of firing line and volleys by 2 Sections of Company reserve.	2 minutes.	50.
In view supports retiring (2 to 3 minutes.	As above— 4th Company.	$\frac{1100}{1000}$	1,000.	Independent by firing line and 2 volleys by 2 Sections of company reserve.	3 minutes.	51.
PROBLEM VII.—(two yellow flags); (1 set of targets, 5 targets No. 2).	As above— 3rd Company.	1,200; afterwards, 1,300 & $\frac{1400}{1300}$	1,470.	Independent by whole firing line, and volleys by company reserve.	5 minutes.	} 80.
In view a body of troops in column retreating by a cross road. (From 4 to 5 minutes).	As above— 4th Company.	1,500, after, 1,400 & $\frac{1600}{1400}$			4 minutes.	

C.

Arrival of the main body of the force, relief of the advanced guard, and attack of right wing (1st battalion) on a wood and of left wing (3rd battalion) on a height.

PROBLEM VIII—(two white flags). The enemy's battery has opened fire. (From 12 to 15 minutes).

Combined battery of 33rd Artillery Brigade.

1,400 paces.

1,150 paces

Shells 11.
Shrapnel 21.

14 minutes

Whole shells, 2.
Splinters, 211.
Bullets, 300
Disabled, 2 guns.
1 Limber

PROBLEM IX—(1 red flag) (two groups heads and shoulders). Enemy's firing line has opened fire. Firing during advance by rushes, charge with bayonet, and occupation of position.
After this problem X.

132nd Bendersk Regt., combined companies of 1st Battalion, 1st Company (Nos. 1&2.) 2nd Company (Nos. 3 & 4.)

900 to F.

900 to 200.

Deliberate independent, 2 sections per company, and from last position, rapid fire by 3 sections.

During advance by rushes.

41.

PROBLEM X—(1 red flag) (2 groups of targets full length figures). In view an extended line retiring. (From 5 to 6 minutes). From this same position problem XI, will be carried out.

As above—1st Company.

700.

650.

Deliberate independent by 3 sections of firing line.

5 minutes.

23.

As above—2nd Company.

800.

600.

6 minutes.

18.

PROBLEM XI—(3 blue flags on the 2nd row of targets.) (4 guns, 8 targets No. 2.) The enemy's artillery moves from its position.
(From 2 to 3 minutes).

As above—3rd Battalion 5th Comy. (Nos. 9 & 10). 6th Company (Nos. 11 & 12.)

1,400, after;
1,200, after;
1,300 & 1,300
1,400, after,
1,500
1,600

1,420.

Volleys by 2 sections of firing line, and by company reserves.

3 minutes.

29.

3 minutes.

3 minutes.

APPENDIX III—(Continued.)

Denomination of problem and parts of fighting formation engaged.	What portion of Force fired.	Elevation. F = fixed sights. 1000 = two elevations.	Actual distance.	Sizes of firing units, description of fire, and in artillery kind of projectile.	Duration of fire.	Hits.
C.—(Contd.)						
PROBLEM XII.—(2 red flags); (one set of 3 targets No. 2, and another of 4 targets No. 2) Besides the extended line (see problem XI), troops in close order are seen retreating. (From 3 to 4 minutes).	132nd Regt. Benderski; combined company of 1st Battn., 1st Company (Nos. 1 & 2). 2nd Company (Nos. 3 and 4).	1000 900	1,200. 1,050.	Volley by 2 sections of firing line, and 2 sections of reserve in each company.	4 minutes. 3 minutes.	21. 38.
PROBLEM XIII.—(2 blue flags); (2 groups head and shoulders and heads only.) Enemy's firing line has opened fire. (Time unlimited). During the time this problem is being carried out, problem XIV.	3rd Battn. 5th Comp'y. (Nos. 9 and 10).	800 to F. 700 to F.	750 to 300. 800 to 250.	Deliberate independent by 2 sections of firing line, and from the last position rapid fire	During advance by rushes.	47. 62.
PROBLEM XIV.—(1 blue flag). Besides the extended line (see problem XIII) a squadron charges to attack the flank of No. 6 company (1 minute). After this resume firing on enemy's firing line, advance by rushes and occupation of position (problem XIII), charge with bayonets. After this problem XV.	3rd Battalion 6th Company, (Nos. 11 & 12.)	Fixed sights.	500. 400. 250.	Volley's by whole Company firing line and reserve.	1 minute.	9 28 80 } 117.
PROBLEM XV.—(4 blue flags); (two groups heads and shoulders.) The enemy's firing line covers the retreat with rapid fire. (From 5 to 6 minutes).	3rd Battalion 5th Company (Nos. 9 and 10), 6th Company (Nos. 11 and 12.)	600. 700.	620. 660.	Rapid independent, afterwards deliberate firing by firing line.	5 minutes. 5 minutes.	28. 27.

C.—Contd.

PROBLEM XVI.—(4 white flags); (4 guns represented by dummies). The battery takes up a new position for the overwhelming of enemy's artillery. (From 7 to 8 minutes.)

PROBLEM XVII.—(4 red flags); preparing with indirect fire the attack on the earth-work. (From 6 to 7 minutes). During the advance of the 1st and 2nd companies the indirect fire was carried on by the 3rd combined company called out from the reserve

PROBLEM XVIII.—(3 white flags). In view troops in close order (3 to 4 minutes). This problem was communicated on the conclusion of problem XVI, and on the same position of the battery.

PROBLEM XIX.—(Two groups of head targets on a breastwork). The enemy in occupation of earthwork meet the attack with rapid firing. (Time unlimited.)

D.

Occupation of earthwork and wood by the right wing, and pursuit of retreating enemy.

PROBLEM XX.—Pursuit with fire of the enemy driven out from the earthworks and wood. (2 to 3 minutes).

Battery of 33rd Brigade	800.	650.	Shells 7. Shrapnel 22.	7 1/4 minutes.	Whole shell, 3. Splinters, 210. Bullets, 239 Disabled. 1 gun, 3 limbers.
2nd Battalions. From the company previously in the advanced guard, 3rd company.	1,400; afterwards, 1,300; afterwards, 1,500.	1,375.	Eight Company Volleys.	7 minutes.	142.
Battery 33rd Brigade.	400.	420.	Shells 5. Shrapnel 15.	3 minutes.	Whole shell, 1. Splinters, 142. Bullets, 318.
1st Battalion 1st Co. (Nos. 1 and 2).	1,200 to F.	1175 to 200.	Deliberate independent by 2 sections; and from last position rapid firing by 3 section per company.	During advance by rushes	24. 42.
2nd Company (Nos. 3 and 4.)	1,150 to F.	1175 to 210.			
Field Battery— 1st Co. (Nos. 1 & 2), 2nd Co. (Nos. 3 & 4), 3rd Co. (Nos. 5 & 6).	Point blank. 700. 600. 700.	175. 600. 650. 650.	Shells 8. Shrapnel 8. Firing line independent, and volleys by reserves.	3 minutes. 2 minutes.	Splinters, 40. Bullets, 212. 181.

APPENDIX III—(Continued.)

ATTACK BY CAVALRY ON THE BEATEN ENEMY.

General Results of Firing.	Rounds fired.		Hits.		Percentage.	
Combined Companies of 1st and 2nd Battalions of 132nd Bendersk Regiment (1, 2, 3, 4, 5, 6, 7 and 8 Companies)=1st Combined Battalion.	8,020	...	845	...	11%	
Combined Companies of 3rd and 4th Battalions of 132nd Bendersk Regiment (9, 10, 11 and 12 Companies)=2nd Combined Battalion.	2,508	...	310	...	12%	
<hr/>						
Total for Infantry*	10,528	...	1,155	...	11%	
Two dismounted Squadrons 36th Dragoons ...	1,201	...	119	...	10%	
<hr/>						
Total for Cavalry and Infantry	11,729	...	1,274	...	11%	
<hr/>						
		RESULTS.			DISABLED.	
		Whole shells.	Splinters.	Bullets.	Guns. Limbers.	
Combined Battery, 4th and 5th Light } Shells 31.	{ Shrapnel 66. }	6	603	1,069	3	4
Batteries of 33rd Artillery Brigade. }						
19th Horse Artillery Battery { Shells 11.	{ Shrapnel 20. }	2	41	93
Totals for Artillery { Shells 42.		8	644	1,162	3	4
{ Shrapnel 86. }						

* The remaining companies did not fire.

(Signature of Chief Umpire—

MAJOR-GENERAL STEPANOFF.)

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At Secunderabad on 18th November 1892.

BY BRIGADIER-GENERAL PROTHEROE C.B., C.S.I.

BURMA 1885-87.

I propose this evening, to give a short account of the military operations in Burma, from their commencement in October 1885, to the end of March 1887, adding at the end, a few remarks on the organization &c., of the mounted infantry, commissariat-transport, and other departments, which owing to the peculiar nature of the campaign, had to be adapted to local circumstances.

The Burma government having refused to grant redress for various injuries inflicted on British subjects, and to accept the proposals made by the government of India for an amicable settlement of existing difficulties, it was decided to despatch an armed force to Mandalay, for the purpose of exacting compliance with its demands. Accordingly a general order was issued by government on the 30th October 1885 for the mobilisation of the following force, and its concentration at Rangoon :—

A naval brigade of Her Majesty's ships on the station.

1 field battery (officers, non-commissioned officers and gunners only.)

2 garrison batteries.

1 mountain battery, British, with mules.

2 " " Native, with coolie equipment.

3 battalions, British infantry.

7 " Native infantry, including 1 Pioneer battalion.

6 companies sappers and miners.

The whole under the command of Major-General H. A. D. Prendergast, C.B., V.C., now General Sir Harry Prendergast, K.C.B., V.C., who was also invested with chief political authority.

A reserve brigade in the Bombay Presidency was at the same time warned for service.

THE DETAIL OF TROOPS WAS AS FOLLOWS :—

Divisional Troops.

Q/1 R. A.

9/1 Cinque Ports Dn. (Mountain) R. A.

3/1 Scottish Division, R. A.

4/1 North Irish Division, R. A.

No. 4 Punjab Mountain Battery, P. F. F.

No. 1 Bombay Mountain Battery.

Nos. 4 & 5 Companies, Bengal Sappers and Miners.

B, D & H Companies, Madras

”

No. 2 Company, Bombay

”

1st Madras Pioneers.

First Brigade Infantry.

2nd Battalion Liverpool Regiment.

2nd Q. O. Bengal L. I.

11th Bengal Infantry.

2nd Brigade Infantry.

1st Battalion Royal Welsh Fusiliers.

21st Madras Infantry.

25th Madras Infantry.

3rd Brigade Infantry.

2nd Battalion Hampshire Regiment.

12th Madras Infantry.

23rd Madras Infantry.

Owing to some delay in the receipt of the G. G. O. by the General Officer Commanding the expeditionary force, some variation occurred in the detail of the Infantry Brigades, which were finally constituted as under:—

1st Infantry Brigade.

Brigadier-General H. H. Foord (since dead), Commanding.

2nd Battalion Liverpool Regiment.

21st Madras Infantry.

25th Madras Infantry.

2nd Infantry Brigade.

Brigadier-General G. S. White, C. B. V. C., Commanding.

2nd Battalion Hampshire Regiment.

12th Madras Infantry.

23rd Madras Infantry.

3rd Infantry Brigade.

Brigadier-General F. B. Norman, C. B., Commanding.

1st Battalion Royal Welsh Fusiliers.

2nd Queen's Own Bengal Light Infantry.

11th Bengal Infantry.

The principal Staff Officers attached to this force were:—

Colonel H. M. Bengough, A. A. & Q. M. G.

„ W. Carey, R. A., C. R. A.

„ G. E. L. S. Sanford, R. E., C. R. E.

Dy. Surgeon General Donnelly, M. D., I. M. S., P. M. O.

Major V. C. Fisher, R. A., Comy. of ordnance in charge.

Captain D. A. A. Macpherson, Field Paymaster.

Lt.-Col. A. F. Laughton, Principal Comst. officer.

For transport purposes a coolie corps, 3,000 strong, was authorized, whilst for the sick and wounded, two field hospitals for British troops, and four field hospitals for Native troops and followers were provided, a general hospital being ordered to be established at Thayatmyo for 5 per cent of the strength of the troops and one per cent of followers.

The troops, in addition to their regular service kit, and followers, received clothing and equipment on the following scale:—

British troops.

2 jerseys, 1 pair of putties, 1 extra blanket,

1 flannel belt.

Native troops.

2 jerseys, 1 pair of putties, 1 blanket, and

2 flannel belts.

Followers.

2 banians or jerseys, 1 pair of native shoes,

1 blanket, 1 coat, 1 flannel belt, 2 pairs of pajamas,

1 water tin, 1 havresack.

Ordnance.—The garrison batteries were ordered to take with them, each, six 6·3 in. howitzers with 100 rounds per gun, and the field battery twelve 5½ in. mortars with 100 rounds per mortar. Twelve 25 pr. guns with field carriages, and 500 rounds per gun, were to be made over to the naval brigade.

Of ammunition, 500 rounds per gun, usual proportion in battery charge and remainder in ordnance charge, and 400 rounds per rifle, 200 in regimental and 200 in ordnance charge, were to be taken.

In addition to the troops above detailed a small mixed force of mounted infantry, numbering 4 officers and 94 rank and file under command of Major E. C. Brown, Royal Scots Fusiliers, was formed to accompany this expedition. It consisted of details from the 2nd Battalion Royal Scots Fusiliers, Rangoon Volunteer Rifles, and the Burma Police.

The naval brigade consisted of 37 officers and 416 seamen and marines, under the command of Captain R. Woodward, R.

N., drawn from Her Majesty's Ships "Turquoise," "Bacchante," "Woodlark," "Sphinx," and "Mariner." These, with the following armament, viz.

Two	64	prs R. M. L.
Twelve	25	prs. R. M. L.
Five	9	prs. R. M. L.
Twelve	Nordenfelt Machine Guns.	
Twelve	Gardner "	

were transferred to eight river steamers and launches, in which they served throughout the active operations on the Irrawaddy, and did excellent work.

The above force rendezvoused at Rangoon between the 5th and 14th November 1885, where it was transferred to river steamers belonging to the Irrawaddy Flotilla Company, and despatched to Thayatmyo on the frontier, where the last vessel arrived on the 18th idem. The heavy guns in naval brigade and R. A. charge were mounted in steamers and barges, and accompanied the transport fleet.

Thus in nineteen days from the date of the G. G. O. directing the despatch of the troops, a fully equipped force including a naval brigade, and troops (except cavalry) from all three presidential armies, of the following strength :—

British,	3,029
Native,	6,005
<hr/>	
Total fighting men,	9,034
„ followers,	2,810
<hr/>	
Total	11,844

were concentrated at the nearest point, Thayatmyo, within British territory, to the enemy's capital, ready to advance at a moment's notice.

The instructions of government specified the immediate object of the expedition to be the occupation of Mandalay. This was, if possible, to be attained, rather by the display, than the use of force, all conflict with the population at large being avoided. These considerations however were not to be allowed to hamper the General Officer Commanding in taking any measures which might be requisite for the security of the troops under his command, and the definite success of the expedition. The Irrawaddy was to be used for the line of advance on Mandalay, coolie transport being provided for any land movement found necessary in the immediate vicinity of that river. After arrival in Mandalay, should further land operations be found necessary, requiring addi-

tional transport, local arrangements were to be made in Burma for such increase as might be required. Permission was also given for the occupation by troops from British Burma, of Ningyan (now known as Pyinmana) about 24 miles north of Tounghoo, should it be considered desirable. Though the information regarding Upper Burma generally was scanty, yet full and accurate sketches of the Irrawaddy river and the forts on its banks were supplied to the force in a Gazetteer of Burma, compiled by Lieutenant-Colonel Macneill, Indian Staff Corps, from personal observation, and from sketches and reports furnished by several officers who had previously visited Mandalay. In addition to this, the accurate local knowledge of the river possessed by the officers of the Irrawaddy Flotilla Company was of the greatest assistance to the expedition.

The organized Burmese army was estimated, in October 1885, to consist of 15,000 to 20,000 men, distributed chiefly at Mandalay, Ava, Myingyan, and Minhla. The river forts were as follows :—One on each bank at Minhla, 50 miles from the frontier, and two on the left bank and one on the right, at the bend of the river at Ava, 12 miles below Mandalay; besides these there were earthworks at Sinbougwe, 20 miles from the frontier, at Nyaungee near Pagan, at Myingyan, and at Mandalay, on the river bank.

For river service the Burmese had 5 gunboats, mostly out of repair, 12 steamers, and 10 steam launches. These forts and vessels were armed with smooth-bore cast-iron guns, for which however serviceable ammunition was wanting.

On the 7th November 1885, King Theebaw issued a Royal Proclamation, announcing the probability of a British advance, and calling the nation to arms ; but it is believed this proclamation evoked little response, probably because of the rapidity of our movements.

The General Officers Commanding the expeditionary force and head-quarters staff arrived at Thayatmyo on the 13th November 1885, and on the 14th orders were received from His Excellency the Commander-in-Chief in India to carry out operations with the utmost vigour and rapidity.

The general plan of advance was for the naval brigade to lead, doing all duties of river guard and reconnaissance, followed by the heavy siege fleet of Royal Artillery in steamers and barges previously prepared, the infantry, followers, and stores bringing up the rear in transports consisting of steamers and flats which were not fighting units of the fleet.

The detailed order of advance was accordingly as follows, and

this order was, generally speaking, maintained throughout, after Minhla until arrival off Mandalay :—

Steamers.		Corps.
1	I. M. S. Irrawaddy & Kathleen	...Naval brigade & Indian marine.
	Thambyadin ...	...G.O.C. & Hd.-Qrs. Staff.
2	Str. Pulloo and flat ...	...Naval brigade.
3	Str. Palow & flat ...	... Do.
4	Str. Yunnan, with White Swan barge...	R. A. 9/I. Cinque Ports, one third of Q/I, and one third of 4/I.
5	Str. Panthay ...	...2/1 R. A. Mountain By.
6	Str. Shoay Myo & 2 flats...	...Mountain Battery.
7...	Burma and 2 flats ...	...2nd Hants. Regt. & Hd.-Qrs. 2nd Brigade.
8	„ Chintsauboo & 2 flats. 1st M. Pioneers, 12th M. I.	
9	„ Ashley Eden & 2 flats and lighter...	23rd M. I., Hazara Mtn. By., & Telegraph stores
10	„ Panlang ...	...Travelling Hospital.
11	„ Ananda ...	...Two thirds of 4/1 R. A.
12	„ Yankeentoun & 2 flats	...2nd L' pool Regt. and Telegraph Department.
13	„ Irrawaddy & 2 flats ...	...21st & 25th M. I.
14	„ Waikema, Hd.Qrs. 1st Bde. & travelling hospital.	
15	„ Ataran & 2 Barges, 4 guns, two thirds of 3/1 R.A.	
16	„ Aloungpya & 2 flats, 1st R. W. Fusiliers.	
17	„ Thooriah & 2 flats, 2nd & 11th Bengal Infantry.	
18	„ Talifoo & flats, Mountain Infantry.	
19	„ Rangoon & flats, Floating Hospital.	
20	„ Mindoon, reserve steamer, coolies & coal.	

Besides the above units were,

Str. Kahbyoo, Commissariat & Postal service.

„ Ngawoon, River Survey.

„ Doowoon, Spare.

„ Kadoe, Despatch boat.

At daylight on 14th November the I. M. S. "Irrawaddy" under the command of Commander W. R. Clutterbuck, R. N., and the launch "Kathleen" commanded by Lieutenant F. P. Trench, R. N., were ordered to reconnoitre the river to a distance of not more than 30 miles, and to capture a king's steamer and flats with Burmese troops on board, which had been sent down to strengthen some of their outposts on the frontier. The steamers and flats were found near some shore batteries at Nyong ben

Maw on the right bank of the Irrawaddy about 28 miles above Thayatmyo. The shore batteries were engaged and the decks of the king's vessels being swept by the fire from the machine guns of the "Irrawaddy", their crews jumped overboard, and their boats were captured and towed down the river to Thayatmyo.

On the 15th November, the entire force not having arrived at Thayatmyo, the General Officer Commanding having dropped two companies of the 2nd Bengal Infantry at Laingha to re-establish telegraphic communication (which had been cut) with Allamyo and give confidence to the villagers on the frontier, steamed 15 miles up the river with the following troops :—

9/1 Cinque Ports R. A.

3rd Infantry Brigade under Brigadier General Norman C.B.

Viz. R. W. Fusiliers, 2nd B. I., and 11th B. I.

2nd Liverpool Regiment, 1st M. Pioneers,

and 12th M. Infantry,

and on the 16th landed and destroyed the stockades at Zoungyan-doung and Sinbougweh, the troops re-embarking in the evening. At daybreak on the 17th the advance was continued to Maloon and Patanago, on the right and left banks of the river, and about 40 miles from Thayatmyo, where the troops were again disembarked for a simultaneous attack on Forts Minhla and Gwegyoungkamyo on opposite banks of the river a few miles further north.

The 1st Infantry Brigade under Br.-General Foord, consisting of the 2nd Liverpool Regiment, 1st Madras Pioneers, 21st and 25th M. I., landed at Patanago, whence it marched through the jungle on Gwegyoungkamyo, a permanent work recently built by some Italians in the king's employ, with a garrison of about 1,700 men. During the advance of the troops, the fort was shelled from the river by the I. M. S. "Irrawaddy" and launch "Kathleen." The enemy was completely surprised by the turning movement, and fled without making any resistance when the troops rushed the work.

The 2nd Bengal Infantry, 11th Bengal Infantry, and 12th Madras Infantry, under command of Colonel Baker, 2nd Bengal Infantry, landed at Maloon, and after some resistance on the part of the enemy, rushed and took the Minhla redoubt on the bank of the river opposite to Gwegyoungkamyo, aided by the fire of the "Irrawaddy" and "Kathleen."

On the 18th November, the Naval Brigade was pushed forward to reconnoitre, and military detachments were left to garrison Minhla and Gwegyoungkamyo, the fort at which latter place was demolished. On the 19th, 20th, and 21st, the advance by the

transport fleet up the river was continued without opposition, whilst on the 22nd the naval brigade engaged and silenced a battery on a cliff at Nyoungoo near Pagan, and having landed a party, destroyed 11 guns. On the 23rd a detachment was landed at Pagan, the advance being continued, and on the 24th, after destroying an earthwork at Konywa, and removing some guns without opposition, the force proceeded to Myingyan, where the enemy could be seen in considerable numbers in a stockade about three miles below that town. It was shelled by the naval brigade and Royal Artillery, and, on the 25th, on troops landing for the attack, it was found to be deserted; a detachment was left here, the advance of the force being continued to Nagoun near Ava and 223 miles from Thayatmyo, where, on the 26th November, envoys from the king with a flag of truce appeared, the final result of the negotiations with these officials being the surrender, on the 27th, of Mandalay and Ava, up to the forts of which latter place the expedition had moved and was threatening. At Ava, Sagaing, and Thabyadan, several small arms were given up with the forts, the Burmese soldiers being disbanded and set free (many of them however had previously disbanded themselves and gone off with their arms).

On the 28th, the expedition occupied Mandalay without opposition, and on the 29th King Theebaw and his family, who had remained at the palace, were deported to Rangoon.

Thus within one month of the issue of the first general order by government on the subject, the objects of the expedition, as specified, had been attained. The casualties during this period were very few, being, killed, 1 British officer, 3 sepoys; drowned, 2 British and 2 Native soldiers; wounded, 4 officers and 22 rank and file.

In connection with these operations three small columns from Lower Burma crossed the frontier, and covered the approaches to it. Two of these started from Thayatmyo. One to the north west, *via* Mindoon under Lieut.-Colonel Hamilton, 2nd Scots Fusiliers, advanced to Ngapehmyo, 40 miles from the frontier; the other to the north-east, on the left bank of the Irrawaddy, under Major Law, 2nd Scots Fusiliers, operated on the frontier, and finally, after some fighting, advanced and occupied Taungdwingyi. The Sittang Valley column, consisting of 81 London Dn. R. A., a wing of the 2nd Somerset L. I., and the 3rd Palamcottah Light Infantry, under command of Colonel Dicken 3rd P. L. I., left Tounghoo on the 24th November, and, after some skirmishing, established themselves at Ningyan (now Pyinmana) on the 3rd December 1885.

The Bhamo expedition left Mandalay on the 19th, and occupied Bhamo without resistance on the 28th December 1885. It consisted of :—

Naval brigade, "Turquoise" and "Bacchante" detachments.

Half battery 41 N. I. Division R. A.

37 Mounted Infantry.

Half battalion Royal Welsh Fusiliers.

Hazara mountain battery.

One company Bengal sappers.

Half battalion 25th M. I. (Head-Qrs.).

The whole was under command of Br.-General Norman, C. B. The General Officer Commanding the force accompanied the expedition. The whole of the Irrawaddy from north to south of Upper Burma thus fell into our hands.

The expedition had now carried out all the instructions originally issued by government.

Before proceeding to describe the subsequent military operations, I propose to make a few remarks on the physical features of Upper Burma as affecting those operations.

Upper Burma and the Shan States dependent on it lie between the 94th and 102nd degrees of longitude. The area included is roughly computed at 140,000 square miles, of which about 75,000 square miles belong to Upper Burma proper. On the west and south this tract is bounded by countries belonging to, or under the influence of, the British government, *viz.* Assam, Manipur, Chittagong, Arakan, Lower Burma, and Karenni. On the south-east it is bounded by Siam; on the east and north, the boundaries are not very definite. In some places independent states intervene between Burma and China, in others the actual influence of the two governments overlaps, so that in former days border states paid tribute to both, and in others their borders are conterminous.

This tract of country is watered by four great rivers, running north and south, *viz.* the Mekong or Cambodia, the Salween, the Sittang, and the Irrawaddy, their basins being generally divided by mountain ranges also running north and south.

As it was decided from the outset not to interfere with the administration of the Shan States more than could be helped, until the administration of Upper Burma was settled, this description will refer chiefly to the valleys of the Irrawaddy and Sittang.

Rivers.—The Irrawaddy runs for some 450 miles through Upper Burma, generally speaking bisecting it. Its height above

the sea level varies from 656 feet at Bhamo on the north, to 145 feet on the old frontier on the south. Its main tributaries are, on the right bank, the Mu, Chindwin, and Yaw, and on the left the Taping, Shweli, Myitnge, and the Yen.

The Sittang has no considerable tributaries, and is only navigable for small steam launches during the rains.

Of these rivers the Upper Chindwin, Taping, Shweli, and Upper Myitnge run through Shan and Kachin states, and the remainder through Burma proper.

The physical features of Upper Burma proper are best described under three heads :—

1. Low-lying alluvial tracts which are well watered.
2. Sandy and comparatively dry tracts.
3. Hilly and jungly tracts.

Under the heading of alluvial tracts may be included the country near the mouths of the Taping and Shweli, the country round Mandalay and Kyaukse, the country on the banks of the Chindwin, the country round Tanngdwingyi in the basin of the river Yen, the country round Saleninyo and Sinbyugyun, north of Mimbū, and the valley of the Sittang.

The sandy and comparatively dry tracts are, (1) the country between the Irrawaddy and the Mu ; (2) the Chindwin and the hills which bound the Yaw valley, between latitudes 21 degs. and 23 degs ; and (3) the country between the Panlang and the Irrawaddy.

The hilly and jungly tracts are, (1) the country north of Mandalay and east of the Irrawaddy ; (2) the country west of the Irrawaddy and north of latitude 23 degs ; (3) the Yaw country ; (4) the country between Mimbū and Thayatmyo ; (5) the line of the watershed between the Sittang and the Irrawaddy ; and (6) the district round the extinct volcano of Popa.

The alluvial tracts are extensively irrigated, and cultivated with rice crops. From February to May inclusive they are hard and dry, and traversable in any direction by all arms ; for the rest of the year they are cultivated or fallow swamps, only just practicable for lightly equipped troops to move in. These fertile tracts are thickly populated, small towns and large villages of 1,000 and 200 houses are found scattered about, whilst villages and hamlets, varying in size from 200 to 20 houses, are numerous everywhere. The former are generally situated on ground raised above the level of the surrounding swamps, in groves of palm trees with dense thorny undergrowth about them ; while the smaller villages and hamlets are more compact, and are frequently located in and on the same level as the swamps. Most of these towns and

villages have some sort of protection round them, such as a wall, stockade, or cactus hedge, according to their size and importance.

The sandy and dry tracts enclose stretches of swampy cultivation, and, except for these patches, are practicable for troops throughout the year. The rainfall thereon is scanty. Villages occur at intervals. All over the country the vegetation consists of thorny scrub jungle; the inhabitants subsist chiefly on jowaree and palmyra-palm sugar, whilst here and there tomatoes, gram, wheat, and other dry crops are grown.

The hilly and jungly tracts were the refuge of the dacoits when pressed by our troops. The jungle is dense, and the tracks through it narrow and tortuous; except by the regular paths, there are hardly any means of approach. The villages are small and far apart, supplies for troops scanty. In March jungle fires occur, when much dry grass and undergrowth are burned, after which, till the rains set in, the country is more practicable for moving about in.

The climate is healthy from January to May, though in April and May the heat is excessive. The most unhealthy times of the year are about the end of May or beginning of June, and September and October, viz., at the commencement and end of the rains.

Communications.—The great waterway of the Irrawaddy is navigable for steamers from the extreme north to the extreme south of the country. Its main tributary, the Chindwin, is navigable for small steamers and launches up to the confines of Manipur. The Myitnge is navigable for launches up to the foot of the Shan Hills. The Taping, the Shweli, the Maddeah, the Panlang, and the irrigation canals of the Kyaukse district, the Yen river on the eastern or left bank, and on the right bank the tributary rivers, Mu, Yaw, Salen, Mon, and Man, are navigable by country boats, which are everywhere procurable. The Sittang is navigable in the rains up to Sinthawa near Pyinmana. Previous to our occupation of the country, there were no main roads or tracks suitable for military requirements. Unmade cart tracks lead from village to village in every direction throughout the country. In the sandy tracts they are open all the year round, in the alluvial districts they are generally closed between June and November. Foot paths and pack tracks lead into and through all the inhabited parts of the country. Columns can advance along these cart tracks on no broader a front than infantry in fours, and along pack tracks in single file.

Supplies.—These were always limited, and through the unsettled state of the country and the active or passive hostility of

the inhabitants, were never to be relied on. Each column had therefore to go fully provisioned for the time it was to keep the field. Except in the sandy tracts, water is everywhere procurable at short intervals, either from running streams, or shallow wells in constant use. In some places the water is brackish.

Accommodation.—Carriage of tents is unnecessary, owing to the excellent accommodation for troops to be obtained nearly everywhere in monasteries (Hpungyi Kyoungs) and rest-houses (Zayats). The monasteries are capacious buildings of wood, raised on piles, and occupied by a few monks; the rest houses surround the monasteries, they have open sides, good roofs, and raised floors. These monasteries and shrines, though revered by the people, are not desecrated when used as resting places by troops or travellers. Whenever the Burmese assemble under arms, they always camp in the monasteries, which are plentiful all over the country, and capable of giving shelter to 200 or 300 men. In the dry weather it is no hardship to bivouac, as large trees with thick foliage are plentiful everywhere.

It was soon found that operations carried on against bands of dacoits by detachments of troops marching through the country were of no avail, unless the dispersion of the dacoits was followed up by the occupations of the district infested by them; consequently after the first few months, operations were undertaken only by columns sent out from posts to disperse gangs in their neighbourhood.

Columns moved with pack transport when available, and as lightly equipped as possible. Their strength rarely exceeded 200 or 300 men, a force usually ample for the work to be undertaken.

As the dacoits so rarely stood, and when attacked, dispersed so quickly, it was necessary to employ cavalry and mounted infantry with the infantry whenever possible. The rapid movements of cavalry and mounted infantry enabled them to surprise gangs of dacoits, and, when surprised, the mounted men could keep touch with them as they fled.

The dacoits had no drill, and generally selected their position for a temporary stand, so that escape from them was easy. They only prepared those sides for defence from which they expected an attack, and on being threatened with a turning movement, at once withdrew. In Burma there are no horses, only ponies. The appearance therefore of cavalry with 15-hand horses struck terror into the Burmese dacoits, especially when they realized that they could not always escape from cavalry.

The moral effect of artillery fire was great, but the range was generally very limited. The troops during the following opera-

tions, which comprised the occupation of the country and suppression of dacoity and rebellion, had a hard time of it. The nature of the operations undertaken required frequent forced marches and night marches, often in bad weather. The bands of dacoits and rebels were on the increase, and the garrisons of most posts had but little respite from continuous and harassing column work.

To return to our narrative. We left the expeditionary force in possession of the line of the Irrawaddy, camped in force at Mandalay and Bhamo, and holding posts on the river at Myingyan, Pagan, and Minbla, between Mandalay and our former frontier near Thayatmyo. The king had been deposed and deported, the Burmese army had dispersed, and an attempt was being made to carry on the government of the country through the "Hlut-Daw", or council of state, at Mandalay with Colonel Sladen, the chief political officer, as the president.

I cannot give you a better description of the state of the country at the end of Decr. 1885, than by reading the following extract from Sir George White's, "Review of 28th August 1886, of the military operations since the fall of Mandalay." He says:—

"It was soon apparent that the authority of the 'Hlut—Daw' had gone with the power which formerly upheld it; that with the fall of Mandalay, the machinery of the Burmese government in the districts had collapsed; that though outwardly the ryots in many places were friendly, yet the members of the royal family, the official classes, and the disbanded troops, possibly in some places the Hpungyis (priests), and lastly the dacoits, who overran the country, were strongly opposed to our rule, and were doing all in their power to persuade the people to resist us and prevent its establishment. The consequence of this was that the British army of occupation, which had secured with great ease the capital of the country, and its magnificent waterway, the Irrawaddy, as a line of communication with its base, found itself on arrival at Mandalay without land transport of any kind, confronted with the task of subduing and holding the districts comprised in Upper Burma, from Bhamo in the north to our old frontier on the south, and from Shan States in the east to the Arakan ranges on the west, an area comprising about 100,000 square miles. It was very soon found that the mere passage of flying columns through disturbed parts of the country did no permanent good; the dacoits or rebels dispersed after being attacked, only to re-assemble immediately after the departure of the troops and inflict punishment on those who helped them. To meet these tactics it was decided, as there was no enemy in the

field in sufficient force to form any objective at which to strike to gradually extend the system of military posts from Mandalay, and thus closely and permanently occupy the country; and with this object in view, and that of freeing as many troops as possible for active operations, it was arranged that at each of these detached posts, a defensive work should be constructed, capable of being held by a small garrison whenever the detachment proceeded out on service."

It would be impossible in the space of a short lecture like this to give a detailed account of the numerous petty engagements with rebels and dacoits, which ensued as we gradually extended our permanent occupation of Upper Burma. Suffice it to say, that up to 31st March 1886 when Lt.-General (now Sir Harry) Prendergast handed over command of the Upper Burma Field Force to Major-General (now Sir George) White, upwards of 30 military posts had been established in different parts of Upper Burma proper; whilst 45 successful fights with rebels and dacoits during that period testified to the activity of the small columns of varied strength and composition, which were constantly moving about the country in search of the enemy. The number of these affairs by no means represents the number of expeditions which were constantly being despatched from posts against dacoits. In many cases the enemy dispersed on hearing of the approach of the troops, and in others defective information gave many a column a tramp for nothing. The troops were continually on the move, and these small fights were the occasional reward of their exertions. The occupation of Bhamo on the 28th December 1885 was of considerable importance, as it took place whilst negotiations with China were going on in regard to our occupation of Upper Burma. After it fell into our hands, some Chinese troops were concentrated on the Yunnan frontier, but confined themselves to defensive precautions, and committed no aggressive acts of hostility, whilst on our side all acts, which might bring us into contact with the Chinese, were carefully avoided. Ultimately a friendly arrangement was come to with China, whereby all interference on her part with Burma was disclaimed.

The operations undertaken by the Eastern Frontier District included the capture in January 1886, by Colonel Johnstone, with a force from Manipur, of Kendate on the upper Chindwin, and the occupation by Major Corse Scott, 4th B. I., of Tummu with a detachment of his regiment.

On the 15th February 1886, His Excellency the Viceroy, accompanied by His Excellency the Commander-in-Chief in India, visited Burma, and proceeded to Mandalay, when certain arrange-

ments were made for the civil administration and for the future military operations to be undertaken in Upper Burma.

On Sir Harry Prendergast's vacation of his command on the 1st April 1886, the military command of Burma was again divided into two, Upper and Lower Burma, the former remaining a Field Force and being given to Brigadier-General G. S. White, C. B. V. C., now Major-General Sir George White, K. C. B., K. C. I. E., V. C.

The Upper Burma Field Force was at that time divided into two mixed brigades.

The 1st brigade, holding some 24 posts in the districts round about Mandalay and Myingyan, and with head-quarters at Mandalay, consisted of,

- 5/1 Southern Division R. A.
- 9/1 Cinque Ports Division R. A.
- No. 1 Mountain Battery.
- Mounted Infantry.
- 2nd L'pool Regiment.
- 1st Battalion R. Welsh Fusiliers (detacht.)
- 2nd Hants Regiment.
- 2nd Madras Lancers.
- Q. O. Sappers and Miners.
- 1st Madras Pioneers.
- Q. O. 2nd B. I.
- 11th B. I.
- 18th B. I.
- 12th M. I.
- 21st M. I.
- 23rd W. L. I.
- 25th M. I.

The second brigade under command of Brigadier-General Norman, C. B., with head-quarters at Bhamo, consisted of,

- 5/1 S. D. R. A. (detacht.)
- 1st Royal Welsh Fusiliers (head-quarters).
- Hazara Mountain Battery.
- 1 Company Bengal Sappers and Miners.
- 26th P. I.,

and held three posts.

In addition to these were two commands independent of the above brigades. One under Colonel Dicken, with head-quarters at Pyinmana, and consisting of,

- 8/1 London Division R. A.
- 2nd Som. L. I. ($\frac{1}{2}$ Battalion.)
- 3rd Palamcottah Light Infantry.

and a few details, holding three posts.

The other under Major Law, Royal Scots Fusiliers, at Taungdwingyi, consisting of,

1 Division 3/1 R. A.

2nd Royal Scots Fusiliers (Detacht.)

26th M. I. (Detachment).

The total strength of the Field Force at this time was, British troops 2,827 ; Native troops 7,701, including 309 cavalry and establishments of 18 mountain guns. It was soon found that this force was not sufficient for the work required of it: reinforcements of $\frac{1}{2}$ Battalion Somerset L. I., 5th & 23rd Bombay Infantry, and 43rd Assam L. I., were accordingly sent, which brought up the total strength of the force to about 14,000 fighting men. The 3rd Goorkhas, 16th M. I., and 25th Bombay Infantry were subsequently added to the force.

In June the Pyinmana command was organized into a third brigade, and this arrangement held good till the commencement of the winter campaign in October 1886, when the whole distribution was reorganized.

It will be understood that the above organization of the Field Force into three brigades was governed more by considerations of correspondence with the brigade commands than anything else. Small columns and garrisons of new posts had constantly to be formed and sent off on very short notice, and the number of rifles required had to be made up from the nearest troops available without regard to the corps from which they were taken. This necessity arose partly from the very heavy sick rate which prevailed during the unhealthy months, and which kept up a continual drain from all the flying columns and posts. The consequence was that detachments from corps became very much mixed.

In July 1886 the 1st brigade was commanded by Brigadier-General Low, C. B., Bengal Army ; the 2nd brigade by Brigadier-General Griffith, Madras Army ; and the 3rd brigade by Brigadier-General Anderson, Bombay Army.

During the month of April 1886 the most disturbed parts were the country round Mandalay, and the Kyaukse, Hlaingdet, and Yemethen districts, where altogether thirty small fights occurred. In May the situation was not much changed ; twenty petty engagements were fought, and the country round Mimbua was much disturbed. In June the Mimbua, Yen, Pyinmana, and Yemethen districts were most disturbed, but the country generally was quiet in comparison with previous months, only nineteen affairs having occurred. The same may be said of July, when also only nineteen petty actions took place. In August there were

twenty-nine and in September twenty-seven of these affairs. Thus during the worst time of the year our troops were engaged in over 150 petty fights, entailing an amount of hard work and exposure to all concerned, which only those who have had experience of it can realize.

Our principal opponents were, near Hlaingdet and Yemethen, the Minzaing Prince ; in Shwebo district, Prince Maung Hmat ; in Mimbú, Boh Shwe and Ootama Hpungyi; and at Pyinmana, Buddha Yaza.

The only operations of any special interest undertaken between April and September were the Poukhan expedition from Bhamo, the withdrawal of the garrison from Ngapeh, and the relief of Salenmyo in the Mimbú District. The events of special interest were the disturbances in Mandalay, and Mr. Deputy Commissioner Phayre's death. Most of the city of Mandalay was burned by incendiaries during these disturbances. Mr. Phayre of the Civil Service, who was Deputy Commissioner of Mimbú, was killed on the 8th June at Padeng when gallantly aiding a mixed party of Native troops and Police to drive off a party of dacoits who had attacked him there.

Salenmyo, which was occupied by a detachment of the Q. O. 2nd Bengal Infantry, was surrounded on the 30th July by two large parties of rebels. The detachment was not strong enough to drive them off, and was relieved by a small force, consisting of 50 rifles 2nd Hants Regiment and 100 rifles 21st Madras Infantry, the whole under the command of Captain Atkinson, 2nd Hants Regiment, who defeated the enemy with great slaughter, their bodies being taken away in cart loads. Unfortunately Captain Atkinson was killed by a jingal ball at the end of the engagement.

The evacuation of the notoriously unhealthy station of Ngapeh, 35 miles west of Mimbú, in the face of the enemy, in August, was skilfully carried out, the only escort that could be spared for the purpose being 100 Native Infantry under command of Major S. E. Rolland, 26th Madras Infantry.

The sick comprised 10 men R. A., 21 men Liverpool Regiment, 73 men Native Infantry, and 31 followers, and the withdrawal was safely effected without loss.

The Poukhan expedition from Bhamo in May failed to accomplish its object, which was the occupation of Khatran, the head-quarters of a Kachin Tsawbwa near the Chinese frontier, who had given some trouble.

It was found that the 14,000 men comprising the U. B. F. F. during the period from April to October 1886 were barely sufficient to permanently hold, and suppress rebellion and dacoity in,

the districts of Upper Burma proper, already occupied by our troops, and quite inadequate to extend the margin of our influence into the surrounding Shan states. Notwithstanding every effort to save the troops from unnecessary exposure during the unhealthy season of the year, the disturbed state of the country allowed of no rest, and the men were actively employed during the whole of the above time. The result of such work on the health of the force can easily be imagined. Between the 17th November 1885, when the army crossed the frontier, and the 31st October 1886, the Field Force, averaging some 13,000 men, lost 3,053 fighting men of all ranks by disease; of these 11 officers and 919 British and Native rank and file died, and 76 officers and 1,956 rank and file, British and Native, were invalided to India. The fatal casualties in action during the same period were, 11 officers and 80 European and Native rank and file. Thus the total loss to the Field Force prior to the commencement of the winter operations of 1886/87 was 3,144, or rather more than 20 per cent of the greatest number of troops at any one time in the field.

It being clear that the force available in Upper Burma was inadequate in strength for the task before it, the government decided to considerably re-inforce it for a cold weather campaign, the object of which should be the complete stamping out of dacoity, and the firm establishment of the civil power throughout Burma.

With this object in view the late Lieut.-General Sir Herbert Macpherson, Commander-in-Chief of the Madras Army, was directed to transfer his head-quarters to Burma, and assume supreme command of the troops there, the command of the Upper Burma Field Force remaining with Major-General White as heretofore.

The Force was increased by upwards of 10,000 men, and on the 1st November 1886 its strength, including some 2,000 men en route for Upper Burma, amounted to 25,599 of all ranks. These were divided for administrative purposes into six brigades, and on the 1st November 1886 stood as follows :—

1st Brigade.—Brigadier-General East, commanding, headquarters Mandalay; detachments at 17 posts.

Troops

- 5/1 S. D. R. A.
- 9/1 M. B. Cinque Ports Dn. R. A. (2 Divns.)
- 1/1 Eastern Division R. A.
- 2nd Somerset L. I.
- 2nd Hants Regiment.
- 7th Bengal Cavalry.
- Q. O. S. & M. one company.
- 5th B. I. Hd-Qrs. Wing.

3rd Goorkhas.

43rd do.

1st Madras Pioneers.

12th Madras Infantry.

17th

23rd W. Light Infantry.

5th Bombay Light Infantry.

25th do. do.

2nd Brigade—Brigadier-General A. T. Cox, commanding, head-quarters Bhamo. Detachments at 3 stations.

Troops.

5/1 S. D. R. A.

Hazara Mountain Battery.

1st Battalion R. W. Fusiliers.

1 company Bengal Sappers & Miners.

26th P. I.

5th B. I. (Wing.)

3rd Brigade—Brigadier-General Lockhart, C. B., commanding, head-quarters not fixed. Detachments at 22 stations.

Troops.

8/1 London Division R. A.

Small detachments of Liverpool, Somerset,

Royal West Surrey, and Royal Scots Fusiliers.

Q. O. Sappers & Miners, one Company.

3rd M. I.

16th M. I.

1st Bombay Grenadiers.

4th Brigade—Brigadier-General Anderson, commanding, head-quarters Myingyan. Detachments at seven posts.

Troops.

No. 1 Bombay Mountain Battery.

1st Bombay Lancers.

2nd Munster Fusiliers.

Bombay Sappers & Miners, one Company.

1st Madras Pioneers.

17th M. I.

23rd Bombay Light Infantry.

27th Punjab Infantry.

5th Brigade—Brigadier-General Stewart, A.D.C., commanding, head-quarters Shwebo. Detachments at nine stations.

Troops.

9/1 Cinque Ports, R. A., 1 Division.

3rd Cavalry Hyderabad Contingent.

1st Royal Welsh Fusiliers (Wing.)

1st South Yorkshire Regiment.

1st Bengal Infantry.

21st Bengal Infantry.

43rd Gurkha Light Infantry (detachment.)

6th Brigade.—Brigadier-General Low, C. B., commanding, head-quarters Mambu. Detachments at 24 stations.

Troops.

7/1 N. D., R. A.

2nd Liverpool Regt.

1st Battalion Rifle Brigade.

1st Madras Lancers.

Bengal Sappers & Miners, one Company.

2nd Bengal L. I.

11th „ Infantry.

3rd Infantry H. C.

26th M. I. (detachment).

Besides these brigades there was the Chindwin command, Lieut.-Colonel Toker, 18th Bengal Infantry, commanding, head-quarters Kindat. Detachments at three posts.

Troops.

No. 1 Bombay Mountain Battery.

18th Bengal Infantry.

1st Madras Pioneers (detachment.)

On the 1st October 1886, all preparations for the winter campaign were practically complete. Owing to the lamented death of Lieut.-General Sir Herbert Macpherson, near Prome, of fever, on the 20th idem, the command, at the request of the Govt. of India, was assumed by the Commander-in-Chief in India, General Sir Frederick Roberts, G. C. B., V. C., now Lord Roberts, who transferred Army Head-Quarters to Burma, arriving in Rangoon on the 9th November 1886. General instructions for the guidance of commanders of columns were drawn up, and the objects to be attained by the ensuing operations may be summarized as follows :—

I. To hunt down Boh Shwè and Ootama, and clear western Mambu of their gangs of dacoits.

II. To hunt down Hla-Oo and his followers in the doab of the Irrawaddy and Chindwin.

III. To hunt down the dacoit leaders and gangs infesting Yemethen and Pyinmana.

IV. The occupation of Kanlè and Pakangyi tracts in the north-west of Myingyan district, and the dispersion of the dacoits now overrunning it.

V. The dispersion and punishment of the isolated bands of

rebels in the neighbourhood of Katha, Shemaga, North Mandalay, Kyaukse, Welaung, Popa, Seh, Wundwin, and possibly Bhamo.

VI. The permanent occupation of the Ruby Mines tract.

VII. The further exploration and pacification of the Chindwin valley.

VIII. The establishment of the same control over Wuntho as was exercised by the late King of Burma, including an acknowledgment of the supremacy of the Indian Government, and the annual payment of tribute.

IX. The exploration and occupation of the Yau country.

X. The despatch of an expedition of adequate strength through a portion of the Shan States, with the object of cultivating friendly relations, establishing a post and Resident at some suitable point, such as Eleywa, to the east of Hlaingdet, and arranging for the security of the railway, both while under construction and after it has been completed.

There is no time to narrate the details of the operations which ensued. It may however be stated shortly, that Boh Shwé's and Hpungyi Ootama's gangs were completely broken up. The former was eventually killed in the hills west of Thayatmyo, on the 5th October 1887, by a small column under command of Major Harvey, South Wales Borderers, and the latter was captured and hanged. Hla-Oo's gangs were dispersed, and he himself killed by one of his followers on the 19th April 1887. After some trouble the gangs of dacoits under Maung Hmat who harried the country between Kyaukse and Pyinmana, were broken up and dispersed, Maung Hmat himself surrendering at Wundwin; and the Welaung, Popah, and Seh dacoits were disposed of; the Yén country was traversed and settled; the Ruby Mines were occupied without much trouble; whilst the result of the operations on the Chindwin secured the tranquillity of that district. Wuntho was occupied, and a fine inflicted on the Tsawbwa, on the payment of which the troops were withdrawn. In the northern Shan States the claims of our nominees, the Thibaw Tsawbwa and the Nyaung Yue Tsawbwa, to the rulership of these states respectively, were upheld, and an expedition, under the command of Colonel Stedman, having routed the Yafsauk Tsawbwa, established a Residency near the Nyaung Yue Tsawbwa's capital.

Neither is there time to detail the occurrences in Lower Burma and the movements of troops during the same period in that command in co-operation with those of Upper Burma, and in the suppression of local disturbances, but I may say that both these objects were thoroughly well attained.

I now proceed to say a few words about the organization &c.,

of the Mounted Infantry, and of the Departments, on which the success of the operations above described so much depended.

Mounted Infantry.—The small detachments of mounted infantry raised and commanded by Major E. C. Browne, Royal Scots Fusiliers, and which accompanied the expedition to Mandalay consisted of :—

	Officers.	Rank & File.
Royal Scots Fusiliers	1	30
Rangoon Volunteers	1	14
Police (Burmese)	2	50
Total	4	94

All were mounted on Burma ponies, the Europeans being armed with carbines and artillery sword bayonets, the Burmese with hogspears and dahs. Their services were found to be of the greatest value, both in accompanying flying columns and in orderly duties, and it was therefore decided to augment their number considerably. Sanction was accordingly obtained to raise a mounted infantry company of 75 rifles at each of eleven of the principal posts throughout Upper Burma, thus giving a total of 825 Mounted Infantry Rifles. The proportion maintained at each post was one European to two Native soldiers, the usual establishment of British and Native officers and non-commissioned officers being kept up.

The men were selected from volunteers from the regiments at each station, and each company was commanded by a commandant selected by the Brigadier-General in whose Brigade District it was located. The whole was placed under the command of Major (now Colonel) W. P. Symons, South Wales Borderers, with one staff officer to assist him. No extra pay was given to the officers and men of the mounted infantry, but commandants were allowed 2 pony chargers and syces each, or, in cases where they kept suitable ponies of their own, double horse allowance. Each mounted man received one pair of cord pantaloons, one drab serge coat, one waterproof cape, a pouch for 20 rounds, a bandolier for 50 rounds, a clasp knife, and a lanyard. Saddles and bridles with head-ropes complete were eventually served out, but in the first instance a large number of "charjamas" were supplied, which turned out a complete failure, though much work was done on them. Warren's cooking pots were served out to the British mounted infantry, and were found to be very portable and useful. The men brought their own arms from their respective corps, as it was thought preferable that they should retain the weapon to which they were accustomed, rather than that they

should all be armed with carbines. The ponies on which they were mounted were all Burmese or Shans, average height about 12-1 $\frac{1}{2}$. Their average cost was Rs. 105-0-0, and their daily feed consisted of 5lbs paddy, $\frac{1}{2}$ oz. of salt, and 25 lbs of green grass. Neither officers nor men had any previous experience or service with mounted infantry, but it was found that after 10 days training, both men and ponies were efficient for all the work required of them. The mounted infantry service was most popular, and all employed thereon, especially the British soldiers, became very handy, doing most things for themselves, and thus affording another contradiction to the idea prevalent amongst some people, that the British soldier in this country requires many native followers in the field. I am sure that many officers here to-night from personal observation and experience in Burma will agree with me, that where he is furnished with suitable appliances and is looked after by his officers, he becomes a most excellent campaigner in rough countries, thoroughly capable of taking care of himself.

Commissariat.—This Department had very great difficulties to contend against. The numerous posts scattered throughout the newly occupied province, and connected by rough tracks which for many months of the year are impassable for carts, had to be kept provisioned; constant flying columns had to be found, at very short notice, in suitable establishments and rations; Indian Marine steamers and launches had to be victualled; and medical servants of all sorts for employment with troops, and at posts, had to be procured from India. It need hardly be said that the Indian Commissariat was equal to the task required of it, and there were no cases, it is believed, of men having to go to bed with their bellies empty, which is about as good a practical test of the efficiency of the Department as there could be.

Transport.

River Transport.—This was chiefly carried out by the vessels of the Irrawaddy Flotilla Company. Nothing could have been better adapted for the conveyance of troops and stores than these commodious steamers and flats. All the fitting up required on each vessel was an arms-rack and a magazine for ammunition. Each steamer carrying troops towed two flats, one lashed on each side of her. The steamers were chiefly side-wheel, with powerful engines, drawing from 2 feet 6 inches to 7 feet 6 inches of water. The tonnage of those chartered for trooping purposes was from 50 to 897 tons. The flats drew from 4 feet 6 inches to 6 feet, and their tonnage varied from 120 to 480 tons.

Coolies.—About 3,000 of these were engaged and taken

over in the first instance, but it was soon found that they were useless for work in the plains : they were accordingly reduced in number, animal pack transport being substituted for them.

Pack Transport.—In January 1886, a scheme for land transport was drawn up, which included 141 elephants and 2,300 ponies, equal to a maundage of about 6,000 maunds. It was soon found that, with the numerous posts throughout the country, the regimental transport system did not work; a general allotment of transport was accordingly made to each Brigade District, amounting to about half transport on field service scale, in addition to 20 per cent spare, the detailed distribution to meet requirements of such movable columns as it might be decided to have ready at posts, and the location of the remaining brigade transport at convenient points for more important movements being left to Brigadier-Generals. The load for ponies was eventually fixed at lbs. 120. It was soon found that sufficient ponies to meet transport demands could not be purchased locally, it was necessary therefore, eventually, to import pack mules from India. Pack mules were also hired locally from the Panthays, a fine race of Chinese Mahomedan muleteers, who work in trading caravans between Burma, the Shan States, and Yunan.

Carts.—Hired cart transport was used to a very great extent in the conveyance of supplies and stores to posts. The Burmese cart is excellently adapted to the rough tracks which serve for roads in Upper Burma, and the bullocks which draw it are powerful animals, well looked after by their owners, and invariably in good condition. To give an idea of the extent to which these carts were hired for the conveyance of public stores, I may mention that, at one post alone, over 1,200 carts were on the transport officer's books as on hire at the same time, whilst at many stations the average daily number of carts on hire was, at times, upwards of 200.

Medical Department.—The medical arrangements originally included two field hospitals for British troops and four field hospitals for Native troops and followers, and a general hospital at Thayatmyo for 5 per cent on the strength of the troops and 1 per cent on that of followers. It was subsequently found necessary to establish a large base hospital at Rangoon.

At the posts, the sections of field hospitals were accommodated in hpungyi kyoungs or other available buildings. The sick who were invalided were, when possible, sent to the nearest river post, and thence conveyed in steamers to the station hospital in Rangoon. That the medical department had no easy time of it may be judged from the fact, already mentioned, that during the

first year of our occupation of Upper Burma more than 20 per cent of the greatest number of troops at any one time in the field either died, or were invalided from disease and wounds.

Signalling.—During the expedition up the river the vessels composing the fleet were all supplied with signallers, the chief signal officer being with the head-quarters of the expeditionary force. Regimental signallers were subsequently employed, as operations extended, in Brigade Districts, and after the formation of six brigades, there were 200 brigade signallers at work. Several stations were in direct communication by visual signalling. The flag, heliograph, and lamp were all used. There was considerable delay in obtaining a sufficient number of powerful lamps and helios. Begbie's lamps were used and answered admirably.

Telegraphs.—Where visual signalling was attended with difficulties, field telegraphs were laid down, and permanent lines were established between all the important centres. On the 20th May 1887 there were 26 stations connected by 466 miles of field telegraph line, and 40 stations connected by permanent wire.

Railways and Roads.—The Tounghoo—Mandalay railway was pushed on rapidly, but owing to its unfinished state (it was not completed till April 1888) was of no use to the troops in 1885-87. Roads were taken in hand on several of the principal lines of overland communication, and up to May 1887, about 890 miles of good roads and bridged cart tracks had been opened out.

Indian Marine.—The Indian Marine rendered excellent service during this expedition. The "Irrawaddy," armed river paddle steamer, with an additional crew of blue jackets on board, led the advance up the river, and subsequently this vessel, the "Sir William Peel", and the "Sladen", a new steamer built by the Irrawaddy Flotilla Co. for the King of Burma, and captured at Mandalay, did much trooping and store conveying up and down the river. The armaments of the "Sir William Peel" and "Sladen" were 2 howitzers, 2 Nordenfeldts, and 2 Gardner guns each; besides these there were 13 armed launches officered and manned by the Royal Navy, and subsequently by the Indian Marine, which were employed in patrolling sections of the river, and putting down river dacoity. This number was subsequently increased by several very light draught steamers specially constructed for service on the Irrawaddy and Chindwin rivers.

Police.—This lecture would be incomplete without some notice of the Upper Burma Police Force, which has supplanted and is gradually taking the place of the troops in the more settled parts of the country. Very soon after the occupation of Upper Burma, it was clear that one of the earliest requirements was

strong civil government, supported by a powerful police force. the duties of which, pending its formation, were really being performed by the troops. A police force was accordingly raised for service in Upper Burma, consisting of two bodies, distinct in organization and nationality, *viz.*, the Military Police which was composed almost entirely of Indians, a great many of whom were seasoned soldiers, and the Civil Police, which consisted entirely of Burmans. At the beginning of 1887, the former consisted of 4,000 men, who were, for the most part, massed at few stations, and seldom came into contact with the dacoits. Later on however the force was increased to about 17,000 men, divided into 18 battalions of various strengths, one for each district, and for the railway line under construction between Toungoo and Mandalay. For the command of this large body of police, an Inspector General with the rank of Brigadier-General was appointed with a Deputy-Inspector-General, also a military officer, to assist him. The control however of all the Police, Military and Civil, within the limits of each civil district, was vested in the Magistrate of the district, who thus had a considerable force at his immediate disposal for the repression of dacoity and other organized offences, without having in the first instance to ask for aid from the military authorities.

Volunteers.—Lastly I would say a few words about the Volunteers in Burma. At the commencement of operations, they consisted of the Rangoon Volunteer Artillery Corps, the Moulmein Volunteer Rifles, the Rangoon Volunteer Rifles, and the Burma State Railway Volunteer Rifle Corps. I do not know what was the effective strength of these corps in 1885, but the total of their efficients according to the last Indian Army List is about 1,400. We have seen that some of their number were actively employed in Burma with the Mounted Infantry, but their great use was undoubtedly in guarding the lines of railway in Lower Burma, and by their presence in Rangoon, Moulmein, and elsewhere, inspiring confidence in the inhabitants, and freeing troops which might otherwise have had to be detailed for these purposes. These are services of which I think they may justly be proud, and which practically illustrate the great importance of the Volunteer Forces in India.

OUTLINE OF A SCHEME FOR RAISING A BALUCH REGIMENT.

BY J. A. H. P.

Major E. G. Barrow in his essay on “*Our recruiting grounds of the future for the Indian Army,” makes the following remarks about Baluchis :—

“I am inclined to think that the most suitable method would in their case be to raise a local militia on the class basis which should gradually be more and more developed until we had in fact the substance of a regular force”.

This is, I believe, the way to get Baluchis to serve in our army.

The Baluch tribal system would here give great help. The Tumandars, the head men of the tribes, are looked up to and respected by all, and their word is law: it would therefore be best to work as far as possible through them.

The point first to settle is from what tribes we should commence to enlist.

I should say those on the Derajat border, as they have been in touch with us longest. I would propose at first to raise one company from each class on this border.

Each Tumandar to give two of his relations as Native officers in his class company, and the whole of the recruiting for the class to be done through them and the Tumandar. The companies should be worked through their Native officers and all innovations should be gradually brought in through them. It would probably be better if the regiment first took the form of a levy. No uniform should be given to the men, nothing done to worry them, and great care taken that all changes necessary should be made very gradually, and if possible it should appear as if the changes were being made at their request.

The regiment should be raised in a place by itself, so that no comparisons could be made with other troops, and so annoy or dishearten the men.

Rakhni on the Dera Ghazi Khan—Peshin road would be an excellent place; it is close to the men's homes, is in a large plain, and some barracks have already been built there.

A drill staff would be required at first; probably Panjabi Mahomedans would be the best men. No Pathans should be sent.

Tact and good temper would be more required by these men

* See Journal of U. S. I. of India No. 96, July 1891,

List of new books.

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No.	Subjects.	Author.	Vols.	Date.
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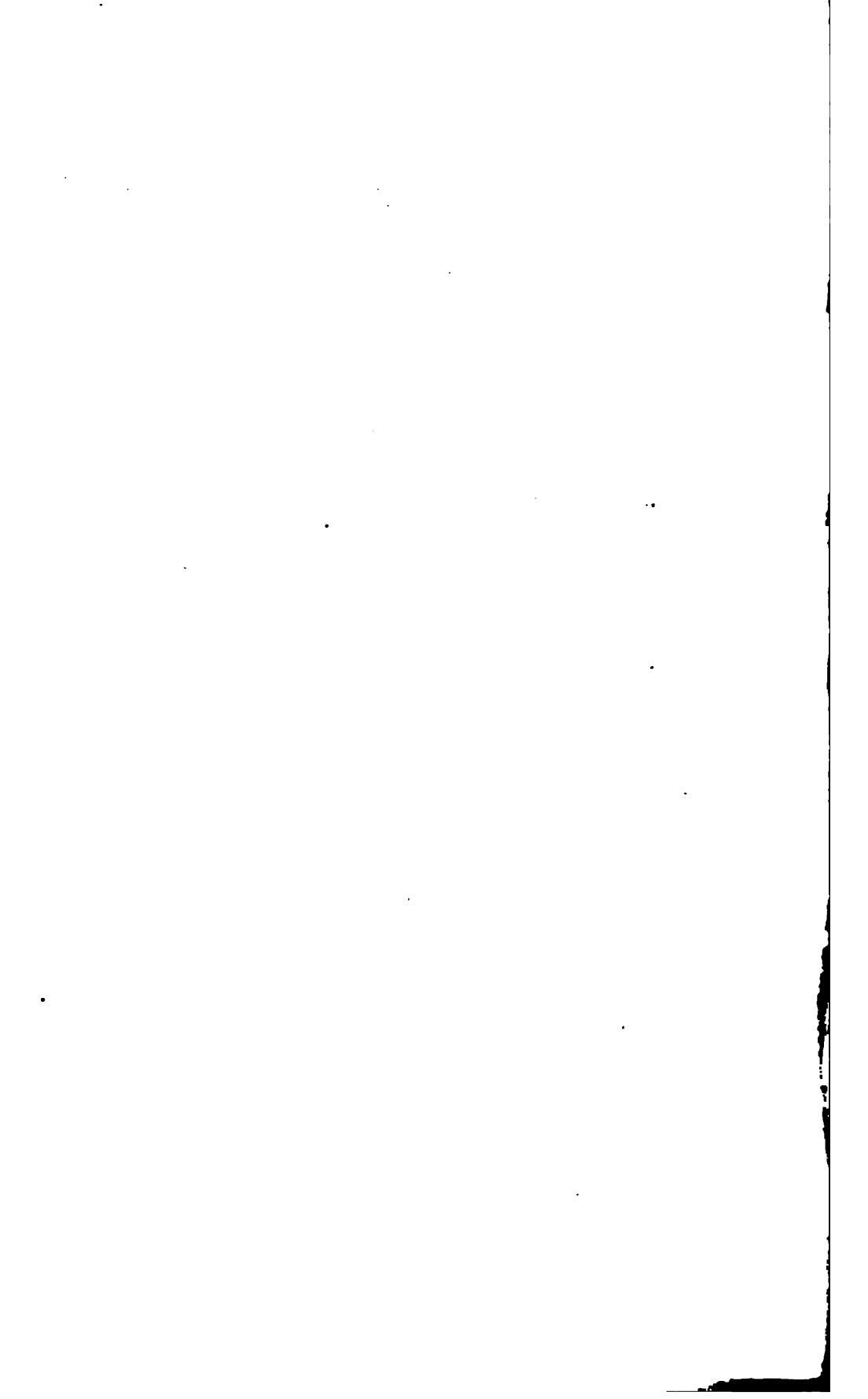
* Presented by Col. M. J. King-Harman, I. S. C.

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Lieutenant ...	Cave-Browne-Cave B. ...	Wiltshire Regiment.
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Lieutenant ...	Dickson J. H. ...	5th Bombay L. I.
Lieutenant ...	Donnan W. ...	19th Madras Infantry.

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Captain ...	Malcolm P. ...	2/4 Goorkhas.
Captain ...	Mayhew H. S. ...	Border Regiment.

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Surg. Major M. D.	Ryan M. R. ...	Medical Staff.
Lieutenant ...	Sheppard G. S. ...	9th Bengal Lancers.
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Lieutenant ...	Stevens N. M. C. ...	21st Madras Pioneers.
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Captain ...	Van Staubenzee C.H.C.	Suffolk Regiment.
Captain ...	Weston E. ...	2nd P. V. R.
Captain ...	Williams F. T. ...	26th Madras Infantry.
Lt. Colonel ...	Williams O. ...	Suffolk Regiment.



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 A. G. M. B., Intelligence Branch.)

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Captain ...	Crowther, R. T. ...	23rd Pioneers.
Captain ...	Cunliffe, E. W. ...	6th Punjab Infantry.
Surgn.-Major..	Cunningham, D. D. ...	I. M. S.
Colonel ...	Cunningham, E. ...	Commanding at Nasirabad.
Lieutenant ...	Currie, R. H. ...	...
Lieut.-Colonel	Curtin, F. J. ...	Gloucestershire Regiment.
Major ...	Curtis, J. G. C. ...	A. A. G. for Musketry, Poona.
Captain, C.I.E.	Daly, H. ...	Staff Corps.
Colonel ...	Dalrymple, W. L. ...	D. Q. M. G.
Major ...	Daniell, A. ...	Queen's Own Guides.
Lieut.-Colonel	Davidson, J. ...	3rd Punjab Cavalry..
Captain ...	Davies, O. E. M. ...	D. A. A. G.
Lieutenant ...	Davies, H. R. ...	Oxford Light Infantry.
Lieutenant ...	Davis, C. ...	1st Bengal Cavalry.
Captain ...	Davison, K. S. ...	D. A. A. G.
Lieutenant ...	Davison, G. C. ...	Leinster.
Colonel ...	Deane, T. ...	Dir. Army Remt. Department
Captain ...	DeBrath, E. ...	Asst. Secy. to Govt. M. D.

Rank.	Name.	Corps or D
Captain, C.I.E., C.M.G.	DeLessepe, A. ...	Asst. Commis
Captain, D.S.O.	DeLisle, H. de S. ...	Durham Light
Colonel ...	DeLatour, E. J. ...	R. A.
Lieutenant ...	DeMontmorency, R.H.L. J.	21st Hussars.
Major ...	Des Vaux, C. H. ...	4th Bengal Inf
Lieutenant ...	Dickson, J. H. ...	5th Bombay L
Lieutenant ...	Dill, W. ...	Wiltshire Regt
Captain ...	Dixon, P. E. ...	R. E.
Captain ...	Dobbie, H. H. ...	30th Punjab I
Lieutenant ...	Dockerill, R. C. ...	2nd Punjab V
Lieutenant ...	Donnan, W. ...	19th Madras I
Lieut.-Colonel	Dorling, F. ...	Royal Sussex I
H. E. Lt.-Genl. K.C.B.	Dormer, The Hon'ble, Sir, J. C.	...
Major, D.S.O. ...	Dorward, A. R. F. ...	R. E.
Captain ...	Douglas, G. B. ...	Queen's Bays.
Lieutenant ...	Douglas, J. A. ...	2nd Bengal L
Colonel ...	Dowden, T. F. ...	R. E.
Major ...	Drummond, F. H. R. ...	11th Bengal L
Lieutenant ...	Drummond, E. J. ...	2-2nd Goorkha
Captain ...	DuMoulin, L. E. ...	Royal Sussex.
Captain ...	Duff, B. ...	D. A. A. G.
Captain, D.S.O.	Dun, E. W. ...	D. A. Q. M. G.
Captain ...	Dunsterville, K. S. ...	R. A. Ordnance

Rank.	Name.	Corps or Department.
Lieut.-Colonel, K.C.I.E., C.S.I.	Durand, Sir H. M. ...	Secy. to the Govt., Foreign Department.
Major ...	Duthy, A. E. ...	R. A.
Lieut.-Colonel	Dyce, G. H. C. ...	33rd Punjab Infantry.
Major-General	East, C. J. ...	Comdg. Secunderabad Dist.
Lieutenant ...	East, C. C. ...	Royal Worwicks.
Lieut.-Colonel	Elles, E. R. ...	R. A.
Major-General, K.C.B.	Elles, Sir W. K. ...	Comdg. Rawul Pindi District.
Major, D.S.O. ...	Elliot, E. L. ...	1st Bombay Lancers.
Colonel ...	Evans, H. M. ...	43rd G. L. I.
Captain ...	Evatt, J. T. ...	39th Garhwalis.
Lieutenant ...	Ewing, J. R. ...	21st Hussars.
Br.-General ...	Eyre, E. H. ...	Q. M. G. Madras.
Major ...	Eyre, V. G. L. ...	34th Pioneers.
Captain ...	Fagan, H. H. F. ...	10th Bengal Lancers.
Lieutenant ...	Fagan, H. R. ...	1st Punjab Infantry.
Lieutenant ...	Fair, J. G. ...	21st Hussars.
Captain ...	Faithful, H. T. ...	Hong Kong N. I. Regiment.
Esquire ...	Fanshawe, A. U. ...	Civil Service.
Esquire ...	Fanshawe, H. C. ...	Civil Service.
Captain ...	Fasken, W. H. ...	10th Bengal Lancers.
Br.-Genl., c.B.	Faunce, E. ...	Comdg. Bangalore District.
Surgn.-Major	Faulkner, A. S. ...	I. M. S.
Lieutenant ...	Faulknor, A. A. M. M...	2nd Bombay Grenadiers

Rank.	Name.	Corps or Department.
Lieutenant ...	Fegen, M. F. ...	R. A.
Captain ...	Fendall, C. D. ...	R. A.
Major ...	Fenton, A. B. ...	2nd Madras Lancers.
Captain ...	Field, W. C. F. ...	Assistant Acct. General, M.D.
Lieutenant ...	Finch, C. ...	1st Bengal Cavalry.
Captain ...	Finch, E. H. ...	E. Lancashire.
Esq., M.A. ...	Finlay, J. F. ...	Civil Service.
Lieutenant ...	Fisher, J. ...	1-2nd Goorkhas.
Colonel C.B. ...	Fitzgerald, C. J. O. ...	Staff Corps.
Captain ...	Fleming J. M. ...	Staff Corps.
Lieutenant ...	Foord, E. R. ...	25th Madras Infantry.
Captain ...	Forbes, L. A. ...	39th Garhwalis.
Captain ...	Forbes, E. E. ...	2nd Madras Lancers.
Lieutenant ...	Ford, C. A. W. ...	4th Bombay Infantry.
Captain ...	Forde, L. ...	R. A.
Lieutenant ...	Forestier-Walker C.E....	R. A.
Lieutenant ...	Forth, W. ...	30th Punjab Infantry.
Captain ...	Foss, K. M. ...	Staff Corps.
Captain ...	Fowler, H. B. ...	The Queens.
Maj.-General...	Frankfort, Lord ...	Comdg. Lahore Dist. Meean Meer.
Major ...	Freeman, B. L. ...	(Late 2nd Punjab Vol. Rifles)
Lieutenant ...	Garratt, H. S. ...	16th Bombay Infantry.

Rank.	Name.	Corps or Department.
Colonel ...	Garratt, A. J. ...	1st Infantry Hyd. Contg.
Captain ...	Gartside Tipping, R. F.	D. A. A. G., P. F. F.
Lieut.-Col., C.B.	Gaselee, A. ...	1-5th Goorkhas.
Br.-Genl., D.S.O.	Gatacre, W. F. ...	A. G. Bombay Army.
Major ...	Gem, A. H. S. ...	Royal Sussex.
Captain ...	Geoghan, T. P. ...	D. A. A. G. Bombay.
Major ...	Gibbs, M. I. ...	31st Punjab Infantry.
Lieut.-Colonel	Gilchrist, R. A. ...	3rd Lancers, Hyd Contingent.
Major ...	Glancy, J. G. ...	Leinster Regiment.
Major ...	Glennie, E. ...	R. E.
Esquire ...	Goad, Horace, B. ...	... ..
Captain ...	Godfrey, S. H. ...	Bombay Staff Corps.
Lieut.-Colonel	Gordon, A. E. ...	Bengal Staff Corps.
Captain ...	Gordon, H. K. ...	Rangoon Mounted Volunteers.
Major ...	Gordon, J. C. F. ...	6th Bengal Cavalry.
Captain ...	Gordon, S. D. ...	Asst. Secy. to Govt. of India M. D.
Lieut.-Colonel	Gordon, S. V. ...	23rd Pioneers.
Captain ...	Gough, S. C. ...	5th Bengal Cavalry.
Lieutenant ...	Graham, G. L. ...	21st Hussars.
Maj.-Genl., C.B.	Graham, T. ...	R. A.
Major ...	Grant, S. ...	R. E.
Colonel, C.B....	Grant, H. F. ...	A. A. G.
Lieut.-Colonel	Grant, Jas. ...	4th Bombay Rifles.

Rank.	Name.	Corps or Department.
Lieut.-Colonel	Graves, B. C. ...	5th Bengal Infantry.
Major ...	Gray, W. du G. ...	4th Punjab Infantry.
H. E. Lt.-Genl. K.C.B., K.C.M.G.	Greaves, Sir Geo. ...	Comdr.-in-Chief Bombay Army
Major ...	Greenfield, R. M. ...	A. A. G.
Lieutenant ...	Greenhill-Gardyne, A. D.	Gorden Highlanders.
Colonel ...	Greig, P. H. ...	7th Bombay Infantry.
Lieutenant ...	Grey, W. G. ...	3rd Madras Light Infantry.
Captain, C.S.I.	Griesbach C. L. ...	Geological Survey Dept.
Lieutenant ...	Griffith, G. H. ...	R. E.
Lieutenant ...	Grove, H. M. ...	1st Bengal Cavalry.
Captain ...	Grover, M. H. S. ...	2nd Punjab Cavalry.
Captain ...	Guinness, E. ...	R. A.
Captain ...	Gwyn, A. ...	Indian Marine.
Colonel ...	Hailes, W. ...	6th Bengal Infantry.
Major ..	Halkett, H. Craigie ...	32nd Pioneers.
Colonel ...	Halkett, W. G. Craigie..	31st Punjab Infantry.
Esquire ...	Hallen, J. H. B. ...	Inspr. Genl. Civil Vety. Dept.
Br.-General ...	Hamilton, A. F. ...	R. E., Comdg. Rangoon Dist.
Captain ...	Hamilton, E. O. ...	The Queens.
Colonel, D.S.O.	Hamilton, Ian S. M. ...	A. A. G. Musketry.
Captain ...	Hamilton, W. G. ...	D. A. A. G.
Col., V.C., C.B., D.S.O., A.D.C.	Hammond, A. G. ...	Guides.
Colonel ...	Handcock, A. G. ...	Staff Corps.

Rank.	Name.	Corps or Department.
Lieutenant ...	Hare, R. H. ...	R. A.
Lieut.-Colonel	Hargreave, H. J. B. ...	B. B. and C. I. R. V.
Lieutenant ...	Harris, A. P. D. ...	11th Bengal Infantry.
Captain ...	Harris, C. W. ...	4th Beugal Infantry.
Captain ...	Harrison, D. C. W. ...	4th Bombay Rifles.
Major ...	Harris, W. O. ...	20th Punjab Infantry.
Esquire ...	Hart, G. H. R. . .	Accounts Department.
Major ...	Hart, H. H. ...	R. E.
Colonel, v.c. ...	Hart, R. C. ...	Director Military Education.
Colonel ...	Harvey, C. L. ...	A. A. G.
Colonel ...	Hastings, F. E. ...	2nd Sikh Infantry.
Major ...	Haughton, J. ...	35th Sikhs.
Captain ...	Hawkins, F. ...	1st Bengal Infantry.
Captain ...	Hayden, F. A. ...	West Riding Regiment.
Lieutenant ...	Heastey, C. R. ...	Royal Inniskilling Fusiliers.
Captain ...	Heaven, F. G. ...	Bombay & C. I. Railway Vols.
Captain ...	Hemphill, F. ...	K. O. S. B's.
Major ...	Henderson, P. E. ...	Assistant Commr. Assam.
Major ...	Henriques, E. N. ...	R. A.
Lieut.-Colonel	Henry, G. ...	R. E.
Captain ...	Herbert, C. ...	Assistant Commr. Ajmere.
Captain ...	Herbert, L. ...	C. I. Horse.
Lieut.-Colonel	Hervey, H. de La M. ...	1st Punjab Cavalry.

Rank.	Name.	Corps or Department.
Esquire, c.i.n.	Hewett, J. P. ...	Civil Service.
Capt., c.i.e., A.D.C.	Hext, J. ...	R. N.
Lieutenant ...	Hickie, A. F. ...	R. H. A.
Sen. Apothary...	Hill, T. H. ...	Staff Officer A. H. N. C.
Lieutenant ...	Hill, J. P. ...	14th Bombay Infantry.
Major ...	Hill, W. ...	1-2nd Gurkhas.
Lieut.-Colonel	Hobday, T. F....	C. G. Eastern Circle.
Lieutenant ...	Hodgson, C. E. ...	1st Bengal Cavalry.
Lieutenant ...	Hodson, G. B. ...	Guides.
Br.-General ...	Hogg, G. C. ...	Q. M. G. Bombay Army.
Major ...	Hogge, C. ...	33rd Bengal Infantry.
Major ...	Hogge, J. W. ...	14th Sikhs.
Captain ...	Holland, P. ...	Paid Attaché I. B.
Colonel ...	Holroyd, W. R. M.	Staff Corps.
Lieutenant ...	Home, J. M. ...	1-2nd Goorkhas.
Lieutenant ...	Horsburgh, R. P.	1st Madras Lancers.
Captain ...	Hovell, H. de B.	Worcestershire Regiment.
Captain ...	Howell, L. J. ...	16th Bengal Cavalry.
Major ...	Howlett, A. ...	12th Madras Infantry.
Maj.-Gen. K.C.B	Hudson, Sir J....	...
Lieutenant ...	Hughes, V. ...	35th Sikhs.
Captain, D.S.O.	Huggins, P. G.	21st Madras Pioneers.
Captain ...	Hume, C. V. ...	R. A.

Rank.	Name.	Corps or Department.
Colonel ...	Hunt, J. L. ...	7th Hussars.
The Hon'ble K.C.I.E., C.I.E. Colonel ...	Hutchins, Sir P. P. ...	Viceregal Council.
Colonel ...	Hutchins, A. G. ...	D. Q. M. G. Madras.
Captain ...	Hutchins, H. L. ...	A. C. General, Madras.
Lieut.-Colonel	Hutchinson, H. D. ...	2-3rd Gurkhas.
Lieut.-Colonel	Hutchinson, J. B. ...	Deputy Commr. Gurdaspur.
Lieutenant ...	Hutton, G. M. ...	R. E.
Captain ...	Ievers, O. G. ...	1st Madras Lancers.
Captain ...	Iggulden, H. A. ...	2nd Derbyshire Regiment.
Colonel, D.S.O.	Ilderton, C. E. ...	"The Queens."
Captain ...	Jackson, J. ...	9th Madras Infantry.
Lieutenant ...	Jacob, C. W. ...	24th Bombay Infantry.
Lieutenant ...	Jacob, H. F. ...	14th Bombay Infantry.
Lieut.-Colonel	James, L. H. S. ...	R. A.
Major ...	Jamieson, A. W. ...	7th Bengal Infantry.
Colonel ...	Jeffreys, P. D. ...	A. A. G.
Major ...	Jenkins, T. M. ...	Deputy Commissioner, Burma
Captain ...	Jenkinson, G. S. C. ...	Derbyshire Regiment.
Colonel ...	Jennings, R. M. ...	D. A. G.
Captain ...	Jermyn, T. ...	2nd Sikh Infantry.
Lieutenant ...	Johnstone, A. A. J. ...	5th Punjab Infantry.
Lieutenant ...	Johnstone, B. A. ...	21st Madras Infantry.
Captain ...	Jones, A. E. ...	23rd Pioneers.

Rank.	Name.	Corps or Department.
Lieut.-Colonel	Jones, W. H. D. ...	2nd Bombay Lancers.
Captain ...	Judge, C. B. ...	2nd Gurkhas.
Captain ...	Justice, C. E. G. ...	13th Bengal Infantry.
Captain ...	Keate, C. R. ...	4th Madras Pioneers.
Br.-Genl., C.B.	Keen, F. J. ...	...
Major, D.S.O....	Keene, A. ...	R. A.
Major, D.S.O....	Keigley, C. M. ...	Assistant Commissary Genl.
Lieut.-Colonel D.S.O.	Keith, J. ...	R. A.
Lieut.-Colonel	Kelly, J. G. ...	23rd Pioneers
Captain ...	Kelly, R. M. B. F. ...	R. A.
Captain ...	Kemball, G. V. ...	D. A. Q. M. G. for Mchn.
Vety.-Major...	Kemp, W. H....	Army Vety. Department.
Lieutenant ...	Kenna, P. A. ...	21st Hussars.
Lieutenant ...	Kennedy, W. M. ...	Royal Inniskilling Fusiliers.
Lieutenant ...	Kennion, R. L. ...	2nd C. I. Horse.
Major ...	Kekewich, R. G. ...	Mily. Secy. to H. E. the C-in-C. Madras.
Lieutenant ...	Kilner, C. H. ...	R. A.
Br.-General ...	Kinloch, A. A. A. ...	Comdg. Allahabad District.
Lieut.-Colonel	Kirkwood, J. N. ...	6th Infantry Hyd. Contgt.
Captain ...	Kitchener, F. W. ...	D. A. A. G. for India.
Major ...	Kitson, G. C. ...	D. A. A. G.
Lieutenant ...	Knight, C. W. ...	4th Bengal Cavalry.
Captain ...	Knox, F. R. B. ...	4th Lancers Hyd. Contingent.

Rank.	Name.	Corps or Department.
Captain ...	Kreyer, F. A. C. ...	16th Bombay Infantry.
Br.-Genl., C.B.	Lance, F. ...	Commanding Presy. Dist.
Lieutenant ...	Laing, F. C. ...	12th Kelat-i-Ghilzais.
Captain ..	Laurence, R. T. R. ...	R. E.
Colonel ...	Lawrence, W. A. ...	17th Bengal Cavalry.
Lieut.-Colonel	Leigh, F. ...	2nd P. Volunteer Rifle Corps.
Captain ...	Lennox, C. F. ...	Suffolk Regiment.
Colonel, C.I.E.	LeMessurier, A. ...	R. E.
Major-General	Lewes, H. C. ...	Inspector Genl. of Artillery.
Lieutenant ...	Liebert, B. R. ...	7th Hussars.
Captain ...	Lindesay, E. ...	Loyal N. Lancashire Regt.
Major ...	Lister, W. J. ...	R. E.
Captain ...	Little, C. B. ...	Somerset Light Infantry.
Major. ...	Lloyd, E. ...	1st Punjab Cavalry.
Lieut.-Colonel	Loch, W. ...	Staff Corps.
Lt.-Col., A.D.C.	Loch, W. ...	Principal, Mayo College.
Major-General K.C.B., C.S.I.	Lockhart, Sir W. S. A...	Comdg. Punjab Frontier Force
Lieutenant ...	Loudon, F. A. ...	25th Madras Infantry.
Lieutenant ...	Loudon, J. A. ...	27th Madras Infantry.
Lieutenant ...	Luck, C. A. ...	2nd Punjab Cavalry.
Maj.-Genl., C.B.	Luck, G. ...	I. G. Cavalry.
Lieut.-Colonel	Lucas, C. A. De N. ...	6th Bombay Cavalry.
Lieutenant ...	Lyne, C. V. N....	16th Madras Infantry.

Rank.	Name.	Corps or Department.
Lieutenant ...	Lyon, J. W. H. ...	15th Madras Infantry.
Lieutenant ...	Macalpine Leny R. L....	16th Lancers.
Lieutenant ...	Macauley, P. J. F. ...	R. E.
Major ...	Macbay, W. G. W. ...	26th Bombay Infantry.
Captain ...	Macdonald, J. R. L. ...	R. E.
Captain ...	Macdonnell, A. C. ...	R. E.
Lt.-Col., D.S.O.	MacGregor, C. R. ...	10th Madras Infantry.
Lieutenant ...	Machlachlan, T. R. ...	Border Regiment.
Major ...	Mackenzie, C. J. ...	D. A. A. G.
Captain ...	Mackenzie, R. ...	R. E.
Esquire ...	Macpherson, J. M. ...	Dy. Secy. to Govt. of India, Legislative Department.
Colonel, C.B....	MacNiell, J. G. R. D. ...	A. A. G.
Lieut., v.c. ...	MacMunn, G. F. ...	R. A.
Colonel ...	Magrath, H. M. S. ...	M. S. C.
Major ...	Maisey, F. C. ...	30th Punjab Infantry.
Colonel ...	Maitland, P. J. ...	Depy. Secy. to Govt., M. D.
Lieutenant ...	Major, F. F. ...	25th Madras Infantry.
Lieutenant ...	Major, F. J. ...	Army School Department.
Captain ...	Maloolm, P. ...	2-4th Gurkhas.
Major ...	Malet, J. W. ...	Northumberland Fusiliers.
Major ...	Mansel, A. ...	R. A.
Captain ...	Markham, C. J. ...	4th K. R. Rifles.
Colonel ...	Marsh, F. H. B. ...	G. L. I.

Rank.	Name.	Corps or Department.
Colonel ...	Marshall, H. S. ...	G. L. I.
Major ...	Martin, R. H. ...	21st Hussars.
Captain, D.S.O.	Mason, A. H. ...	D. A. Q. M. G., I. B.
Captain ...	Massy, G. ...	1st Norfolk.
Major ...	Masters, A. ...	1st C. I. Horse.
Captain ...	Maunsell, G. W. ...	Royal West Kent.
Captain ...	Maxwell, G. W. ...	26th Madras Infantry.
Lieutenant ...	Maxwell, H. G. ...	Asst. Comdt. Upper Chindwin Bn. Military Police.
Captain ...	Mayhew, H. S. ...	Border Regiment.
Captain ...	McCarthy, C. A. ...	19th Punjab Infantry.
Surgn.-Major ..	McCartie, C. ...	39th Garhwalis.
Colonel ...	McNiell, D. ...	Dist. Supdt. Police, Saugor.
Captain, D.S.O.	McSwiney, E. H. F. ...	D. A. Q. M. G., I. B.
Lieutenant ...	McSwiney, W. D. ...	7th Dragoon Guards.
Captain ...	Meade, M. J. ...	Staff Corps.
Lieutenant ...	Medley, A. G. ...	19th Bengal Lancers.
Captain ...	Medley, E. J. ...	17th Bengal Cavalry.
Lt.-Col., C.M.G.	Meiklejohn, W. H. ...	20th Punjab Infantry.
Lieut.-Colonel	Mellis, H. ...	Staff Corps.
Colonel ...	Menzies, O. ...	Staff Corps.
Lieutenant ...	Mercer, H. W....	26th Madras Infantry.
Esquire, C.S.I.	Merk, W. R. H. ...	Civil Service.
Colonel ...	Michell, J. W. A. ...	13th Bengal Infantry.

Rank.	Name.	Corps or Department.
Lieut.-Colonel	Michell, St. John F. ...	A. A. G.
Lieutenant ...	Millar, W. H. ...	27th Punjab Infantry.
Captain ...	Miller-Walnut, C. C. ...	Gordon Highlanders.
Lieutenant ...	Milne, G. F. ...	R. H. A.
Lieut.-Colonel	Molloy, E. ...	2-5th Gurkhas.
Colonel ...	Money, E. A. ...	3rd Bengal Cavalry.
Major ...	Money, E. E. ...	9th Bengal Lancers.
Captain ...	Money, G. A. ...	18th Bengal Lancers.
Major ...	Montgomery, J. A. L. ..	Deputy Commissioner, Sialkot
Captain ...	Moore, G. H. J. ...	Merwara Battalion.
Lieut.-Colonel	More-Molyneux, G. H...	1st Bengal Infantry.
Colonel ...	Morris, R. ...	1st Bengal Cavalry.
Lieutenant ...	Morris, R. L. ...	3rd Bengal Cavalry.
Lieut.-Colonel	Morse, W. J. ...	12th Bombay Infantry.
Major ...	Morrison, R. H. ...	18th Hussars.
Colonel ...	Mortimer, F. J... ..	R. A.
Lieutenant ...	Morton, E. R. ...	31st Punjab Infantry.
Br.-General ...	Morton, G. de C. ...	Offg. A. G. in India.
Captain ...	Mullins, W. B.... ..	33rd Punjab Infantry.
Captain ...	Murray, G. ...	3rd Punjab Cavalry.
Colonel, D.S.O.	Murray, K. D. ...	Asst. Adjutant General.
Lieutenant ...	Murray, S. L. ...	Gordon Highlanders.
Maj-Genl., C.B.	Nairne, C. E. ...	Commanding Meerut Dist.

Rank.	Name.	Corps or Department.
Lieutenant ...	Nangle, K. E. ...	25th Madras Infantry.
Lt. the Hon'ble	Napier, H. D. ...	C. I. Horse.
Lieutenant ...	Napier, G. S. F. ...	Royal Sussex Regt.
Captain ...	Nedham, E. M. ...	S. C.
Sargn-Maj. M.D	Nelis, J. A. ...	I. M. S.
Major ...	Neville, J. P. C. ...	14th Bengal Lancers.
Major ...	Newall, W. P. ...	1-2nd Goorkhas.
Lieut.-Colonel	Newill, J. H. ...	S. C.
Lieut.-General	Nicholl, T. ...	R. A.
Surgn.-Capt...	Nichols, F. P. ...	21st Madras Pioneers.
Captain ...	Nicholson, J. S. ...	7th Hussars.
Colonel, C.B....	Nicholson, W. G. ...	R. E.
Captain ...	Nixon, J. E. ...	18th Bengal Cavalry.
Lieutenant ...	Norie, C. E. ...	1-2nd Goorkhas.
Captain ...	Norman, W. W. ...	2nd Punjab Cavalry.
Lieutenant ...	Norton, C. E. ...	7th Hussars.
Colonel ...	Nutt, H. L. ...	Political Supdt. Savantvadi.
Captain ...	O'Connor, G. ...	Queen's Bays.
Captain ...	O'Donnell, G. B. ...	Pol. Agent Mahikhantha.
Captain ...	O'Donoghue, M. E. ...	13th Madras Infantry.
Lieutenant ...	Ogg, G. S. ...	R. A.
Captain ...	O'Neill, W. H....	R. H. A.
Major ...	Ormerod, G. S. S. ...	Royal Munster Fusiliers.

Rank.	Name.	Corps or Department.
Lt.-Col., C.I.E.	Ottley, J. W. ...	R. E.
Surgn.-Major C.M.G., C.I.E.	Owen, C. W. ...	I. M. S.
Captain ...	Owen, R. ...	21st Hussars.
Br.-Genl., C.B.	Palmer, A. P. ...	Comdg. Myingyan District.
Captain ...	Parson, J. H. ...	7th Bengal Cavalry.
Esquire. ...	Patterson, A. B. ...	Civil Service.
Captain ...	Patterson, G. ...	Gympie Mounted Infantry.
Lieutenant ...	Patterson, H. Mc N. ...	5th Bengal Cavalry.
Captain ...	Paul, E. T. ...	6th Bengal Cavalry.
Lieutenant ...	Peach, E. ...	3rd Madras Light Infantry.
Colonel ...	Pemberton, R. C. B. ...	R. E.
Colonel, C.B....	Pennington, C. R. ...	Comdg. at Jullundur.
Major ...	Pennington, R. L. A. ...	Northumberland Fusiliers.
Major ...	Penton, H. E. ...	7th Bombay Infantry.
Captain ...	Perceval, E. M. ...	R. A.
Captain, M.G....	Peyton, W. J. ...	A. D. C. to H. E. the C.-in-C. Bombay.
Captain ...	Phillips, C. ...	D. A. A. G.
Lieutenant ...	Phillips, I. ...	1-5th Goorkhas.
Captain ...	Phillips, R. E. ...	The Buffs.
Lieutenant ...	Pigou, F. H. ...	1st Infantry Hyd. Contingent
Captain ...	Pilkington, H. L. ...	21st Hussars
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Captain ...	Pollard, W. C. ...	15th Bengal Cavalry.
Lieut.-Colonel	Porteous, C. E. ...	4th M. I.
Major ...	Porter, A. R. ...	28th Punjab Infantry.
Captain, D.S.O.	Preston, J. E. ...	33rd Madras Infantry.
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Captain ..	Prichard, G. P. M. ...	D. A. A. G.
Captain ...	Pringle, A. ...	2nd Bombay Lancers.
Colonel ...	Prinsep, A. H. ...	Commanding Cawnpore.
Colonel ...	Pritchard, H.	Acct. Genl. Mily. Department
Lieutenant ...	Prowse, G. W. T. ...	Duke of Cornwall's L. Infy.
Lieut.-Colonel	Pulford, R. R. ...	R. E.
Captain ...	Rainey, R. M. ...	12th Madras Infantry.
Captain ...	Ramsay, J. G. ...	D. A. A. G.
Lieut.-Colonel	Ranking, W. L. ...	13th Madras Infantry.
Lieutenant ...	Ravenhill, F. T. ...	Q./- R. H. A. .
Lieut.-Colonel	Reid, A. J. F. ...	29th Punjab Infantry.
Lieutenant ...	Rennick, F. ...	40th Bengal Infantry.
Captain ...	Reynolds, T. G. C. ...	2nd Royal Inniskilling Fusr.
Lieutenant ...	Ricketts, H. C....	15th Bengal Lancers.
Lieutenant . .	Ricketts, L. H. ...	12th Madras Infantry.
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Colonel ...	Rivas, V. ...	37th Dogras.
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Lieut., The Hon'ble.	Roberts, F. H. S. ...	King's Royal Rifles.
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Esquire ...	Robertson, F. A. ...	Civil Service.
Colonel, c.i.e.	Robertson, J. ...	Retired.
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Captain ...	Robinson, J. G. ...	1-2nd Goorkhas.
Major ...	Rochfort, A. N. ...	R. H. A.
Captain ...	Rodwell, E. H. ...	2nd Punjab Infantry.
Surgn.-Major..	Roe, W. A. C. ...	I. M. S.
Colonel ...	Rogers, G. W. N. ...	2nd Royal Irish.
Lieutenant ...	Ross, T. C. ...	Highlander Light Infantry.
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Major ...	Routh, W. A. ...	Suffolk Regiment.
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Major ...	Rundall, F. M. ...	2-4th Goorkhas.
Surgn.-Major, M. D.	Ryan, M. R. ...	Medical Staff.
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Colonel ...	Shakespear, G. R. J. ...	A. A. G.
Lieutenant ...	Shakespear, L. W. ...	2-2nd Goorkhas.
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Lieutenant ...	Sherwin, F. W. H. ...	2nd Royal Inniskilling Fusr.
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Major ...	Simpson, H. C. C. D. ...	R. A.
Capt., D.S.O. ...	Sinclair, A. L. ...	27th Bombay Infantry.
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Lieut., v.c. ...	Smith, J. Manners ...	I. S. C.
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Major ...	Stevenson, F. ...	A, A. G.
Lieutenant ...	Stewart, J. A. ...	R. A.
Lieut.-Colonel	Stopford, A. B. ...	A. A. G.
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Major ...	Temple, R. C. ...	Rangoon.
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Captain ...	Thomson, W. D. ...	1st Bengal Cavalry.
Captain ...	Thring, R. H. D. ...	1st Bengal Lancers.
Captain ...	Thwaytes, E. C. ...	24th Madras Infantry.
Major-General	Tillard, J. A. ...	R. A.
Lieut., D.S.O...	Tighe, M. J. ...	1st Biluchis.
Lieutenant ...	Tighe, F. ...	R. A.
Lieutenant ...	Tod, J. K. ...	7th Bengal Cavalry.
Colonel, C.I.E.	Tomkins, W. P. ...	R. E.
Captain ...	Towelle, M. ...	2nd Punjab Vol. Rifles.
Major ...	Travers, A. E. ...	Persian Interpreter to C-in-C. India.
Lieutenant ...	Tribe, C. W. ...	38th Dogras.
Colonel ...	Trotter, P. D. ...	Argyll and Suthd. Higdrs.

Rank.	Name.	Corps or Department.
Lieutenant ...	Troup, H. R. ...	26th Madras Infantry.
Lieut.-Colonel	Tucker, L. H. E. ...	Bengal Staff Corps.
Lieut.-Colonel	Turner, A. H. ...	2nd Punjab Infantry.
Lieut.-Colonel	Turner, S. C. ...	R. E.
Captain ...	Unwin, G. B. ...	1st Punjab Cavalry.
Lieutenant ...	Vanrenen, G. R. ...	16th Bengal Infantry.
Captain ...	Vansittart, E. ...	2-5th Goorkhas.
Captain ...	Van-Straubenzee, C.H.C.	Suffolk Regiment.
Br.-General ...	Van-Straubenzee, T. ...	Commanding Madras District.
Captain ...	Vaughan, H. B. ...	7th Bengal Infantry.
Lieutenant ...	Vickers, H. ...	23rd Madras Infantry.
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Major-General	Walker, A. ...	D. G. O.
Major ...	Walker, J. N. ...	13th Bombay Infantry.
Lieutenant ...	Walker, W. R....	15th Madras Infantry.
Captain ...	Wallace, A. ...	25th Punjab Infantry.
Esquire ...	Wallis, B. G. ...	P. W. D.
Lieutenant ...	Wallis, F. J. ...	15th Madras Infantry.
Captain ...	Walter, J. McN. ...	Devonshire.
Lieutenant ...	Walters, H. F....	24th Bombay Infantry.
Lieut.-Colonel	Ward, A. E. ...	S. C.

Rank.	Name.	Corps or Department.
Lieutenant ...	Warden, A. W....	3rd Lancers Hyd. Contg.
Lieut.-Colonel	Warner, W. B....	1st Madras Lancers.
Colonel ...	Waterfield, H. G.	Commanding at Ferozepore.
Captain ...	Watkis, H. B. ...	31st Punjab Infantry.
Captain ...	Watkins, L. G....	R. A.
Major	Watson, A. J. ...	Suffolk Regiment.
Lieut.-Colonel	Watts, J. B. ...	5th Bengal Cavalry.
Lieutenant ...	Webster, T. ...	12th Bengal Infantry.
Captain, D.S.O.	Westlake, A. P.	1st Madras Lancers.
Major ...	Westmoreland, C. H. ...	42nd G. L. I.
Captain ...	Weston, E. ...	2nd Punjab Vol. Rifles.
Major ...	Wetherall, W. A.	22nd Bombay Infantry.
Major ...	Wheatley, H. S.	2-3rd Goorkhas.
Major-General, K.C.B., V.C.	White, Sir G. ...	Commanding Quetta District.
Captain ...	White, F. P. L.	5th Punjab Infantry.
Captain ...	Whyte, C. W. ...	17th Bombay Infantry.
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Major ...	Wilkieson, C. B.	R. E.
Maj.-Genl., C.B.	Wilkinson, H. C.	British Service.
Captain ...	Williams, F. T....	26th Madras Infantry.
Captain ...	Williams, H. A.	Bangalore Volunteers.
Lieut.-Colonel	Williams, O. ...	Suffolk Regiment.

Rank.	Name.	Corps or Department.
Lieutenant ...	Williams, C. H. ...	25th Madras Infantry.
Major ...	Williams, W. B. ...	Wiltshire Regiment.
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Captain ...	Wilmot, I. Eardley, ...	D. A. A. G. for Musketry.
Colonel ...	Wilmot, R. Eardley, ...	14th Bengal Lancers.
Lieut.-Colonel	Wilson, E. H. ...	34th Pioneers.
Major ...	Wilson, W. B. ...	12th Bengal Cavalry.
Lieut.-Colonel	Wilson, F. A. ...	Pol. Asst. Bundelkund Nowgong.
Lieutenant ...	Wimberby, C. J. ...	8th Bengal Cavalry.
Captain ...	Wingate, A. W. ...	14th Bengal Lancers.
Major ...	Wingate, G. ...	Asst. Commissary General.
Major ...	Wintour, F. ...	Royal West Kent Regiment.
Major ...	Wood, E. J. F. ...	10th Bengal Lancers.
Colonel, c.B....	Woodthorpe, R. G. ...	R. E.
Captain ...	Woolcombe, C. L. ...	K. O. S. Porterers.
Major ...	Wrench, A. J. C. ...	Royal Welsh Fusiliers.
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Captain ...	Wylly, H. C. ...	Derbyshire Regiment.
Captain ...	Yate, W. G. ...	4th Bengal Cavalry.
Surgn.-Major	Yeld, H. P. ...	I. M. S.

Rank.	Name.	Corps or Department.
Colonel ...	Yeatman, Biggs A. G....	R. H. A.
Major ...	Young, E. A. ...	11th Bengal Lancers.
Colonel ...	Young, G. F. ...	A. Q. M. G.
Captain ...	Young, W. H. ...	Mily. Accounts Departmen
Major ...	Young, H. H. ...	27th Madras Infantry.
Captain, C.I.E.	Younghusband, F. E. ...	I. S. C.

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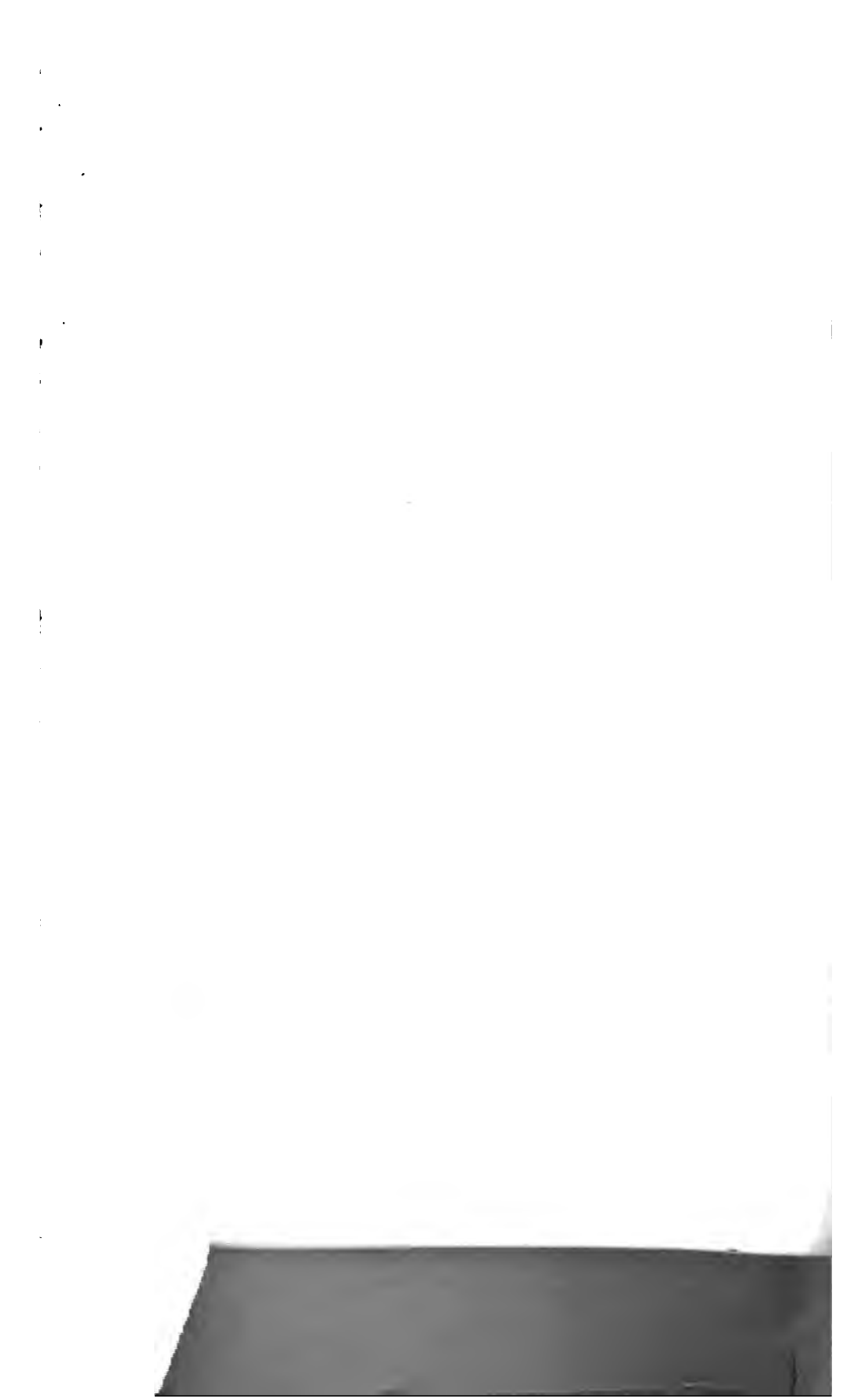
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ERRATA.

In the article on the Double Company system in the May number of this Journal 1893, at page 160, line 8, the chest measurement of the men should have been shown as 34"·33" not as 31".

Therefore I consider the best system of organization for native cavalry is that now in existence, with certain alterations to adapt it to the increased tactical independence of the squadron, and also to the larger number of European officers who now serve with each regiment.

By this I mean that the one and great idea ought to be, decentralization, and that the squadron should be made the administrative unit in every way, and as complete and independent in itself as it is tactically in the field.

I.—THE SQUADRON.

I would have the squadron as the sole administrative unit, doing away entirely with the troop; the squadron to be enlisted from one class only, and divided into four divisions, each under the immediate charge of a Native officer, who would be as responsible for his division as the gunner subaltern is for his division in a battery.

This would agree with the old *ressala* of the native armies, and would be commanded by a *ressaldar*, with a *ressaidar* under him, and two *jemadars* or *subalterns*.

The squadron should be complete in all its staff, so as to be detachable from the regimental head-quarters at the shortest notice.

The training of recruits and remounts should be carried out in the squadron, under the orders of the squadron commander; the direct instruction being entrusted to one of the *jemadars*, and one of the squadron *kote-duffadars*.

The pay and equipment accounts of the squadron should be separated, one part being taken by each of the two pay-duffadars. The squadron administrative staff would be :—

Two *kote-duffadars*, one for duties as at present, the other for instruction.

Two pay-duffadars, one for the muster-roll and pay accounts, the other for equipment.

One farrier-duffadar, and three farriers; the farrier-duffadar being immediately responsible for his several duties to the squadron commander.

One assistant orderly-room clerk, who would as a rule, work in the regimental orderly-room, but be always ready and available for detached duties with his squadron.

One assistant *salutri*, and one assistant armourer, to be similarly available.

Two trumpeters as at present, but the trumpet-major to be separate, and borne on the regimental staff.

II.—THE REGIMENT.

The regimental staff ought to be much less executive than at present, the commanding officer only generally superintending squadron commanders in their commands, without any individual interference, as long as things go well.

The whole of the regimental administrative staff should be distinct from the squadrons, and be borne on, and paid through, the regimental staff muster-roll.

Squadron commands being carried on thus independently, the necessity of a wordie-major would cease, and he ought to be transferred to one of the squadrons as a *ressaidar*.

But I would have the *ressaidar-major*, as the senior Native officer of the regiment, a regimental staff officer, independent of any particular squadron.

He should be, as being presumably of great weight and influence, the direct representative of all the Native ranks, and confidential adviser to the commandant: indeed, very much what the old Native commandant was in many regiments.

A regimental *kote-duffadar* would be necessary to carry on the duties similar to those of a regimental sergeant-major.

The trumpet-major should also be borne on the regimental staff, and distinct from any squadron, and also the *salutri-duffadar*.

In this category would also come a quarter-master duffadar in charge of regimental and government stores, an orderly-room duffadar, and the armourer-duffadar.

TRANSPORT AND TENTAGE.

As a simple matter of economy the maintenance of more tentage than is actually required on active service is faulty.

The present system is to have a tent to each "jori," but as soon as the regiment takes the field, four, or even possibly six men, are put into one tent; this system entails much unnecessary expense on the men.

Tentage, I think, should be a squadron chunda, and the tents, when not in use, should be stored under squadron arrangements, and only such a number kept up, as would be required under the service equipment tables.

The transport ought to be entirely mules, one for each jori, as at present, but bought through a squadron chunda, as the troopers would without doubt, take more care of the mules, and have a greater interest in their well-being, if they were squadron, instead of regimental, property.

A FEW REMARKS ON THE ARMAMENT OF OUR CAVALRY, FIELD ARTILLERY, AND INFANTRY, AND THEIR EFFECT IN WAR.

By Lieutenant-General H. R. BROWNE.

The first point to which I desire to invite attention is the very remarkable disproportion of the casualties in battle due to the action of cavalry, artillery, and infantry.

Quoting the high authority of the celebrated German Military Surgeon, D. Billroth, the percentage of wounds inflicted by the respective arms, during the whole course of the Franco-German war of 1870, stood nearly as follows :—

Wounds by Infantry fire	...	...	80	per cent.
" " Artillery "	...	...	15	" "
" " Cuts and Stabs	...	...	5	" "

100

The cuts and stabs of course represent the wounds due to the sword, the lance, and the bayonet, the proportion for each being probably nearly equal, leaving little over three per cent of wounded men as the result of the arms used by the great masses of cavalry employed in that war.

No statement could possibly deserve more serious consideration.

1st. As regards cavalry it goes far to show, that whatever their arms may be, the chief result of the action of cavalry is due to the shock or impetus of men and horses, rolling up and riding down their opponents, and to "moral effect."

In all cavalry actions there will be occasional single combats, but these are the exceptions. It may be taken as probable, that something like three-fourths of the men engaged in a charge never strike a blow at all, and of the remaining fourth only a percentage will make effective use of their arms.

This is not an unreasonable assumption, if the circumstances of a cavalry charge are considered. The very small percentage of wounds inflicted by cavalry arms almost proves it. There is hardly a more striking sight, than the dismounted sword practice of a well drilled cavalry regiment, for precision and smartness. But an attentive observer of the same corps, mounted and exercising at speed, cannot fail to notice how completely the precision and energy he has so much admired in the use of arms, disappears. It must be so. The number of men capable of managing an excited horse in a crowd, and of delivering even fairly accurate cuts or points with a sword, or of making effective thrusts with a lance, is but a small percentage of those engaged.

Now of the cavalry arms. First and foremost in the opinion of many, stands the lance. It has been styled the queen of weapons,

and a very showy gallant appearance it undoubtedly has ; a fine lancer regiment can hardly be equalled for appearance. But let us look quietly and dispassionately at the dry hard facts, as stated by one of the most experienced and best known military surgeons, who says that only five per cent of wounds are cuts and stabs ; of these, the lance can only claim its share, two-thirds belonging to the sword and the bayonet. So that beyond appearance and perhaps a certain moral effect peculiar to itself, the lance has no great pretensions as a weapon of offence. It is unhandy and unsuited to close combat. Leading ranks only can use it in a charge, and it has the disadvantage of disclosing the position of troops more readily than any other arm; lance points and pennons can be seen at great distances. For duties on outpost and patrol, no more inconvenient weapon could well be desired. The sword, or sabre, has from time immemorial been associated with the idea of a mounted soldier ; it is almost difficult to think of him without it, yet what are the effects it actually produces, as evidenced by the general statistics of a great war, in which exceptionally large numbers of mounted soldiers were engaged ? The casualties due to the sword amounted to about "one-third of five per cent" of the total of wounded. There is a serious lesson in this, not easily learnt, and still more difficult of acceptance.

If sword and sabre are to continue as cavalry arms, there must be a choice between the two. They are exemplified in our own services on a fairly sufficient scale.

There is a long heavy blunt sword with a clattering steel scabbard that destroys the edge, in the hands of our English regiments, and a short light sharp sabre in a scabbard that makes no noise and preserves the edge, in those of our brother soldiers of the Indian army. The choice ought not to be difficult, and yet it will take much convincing before it is made.

The pistol as an arm of a mounted soldier is rather a weapon for occasional use, chiefly that of personal defence; its range is limited to little more than a few yards, and even then, very considerable practice is necessary before good use can be made of the weapon. Officers, and perhaps a certain proportion or certain ranks of non-commissioned officers may usefully be armed with pistols. The detached duties on which they may frequently be employed render such a weapon desirable. But beyond this, the consideration of the pistol as a cavalry arm can hardly go.

The arm most likely to produce real effective results in the hands of mounted troops, that is to say, the weapon from which the highest percentage of casualties to an enemy may be looked for, must be the carbine. Not the carbine as it now exists, but a thoroughly well constructed, light, short, handy rifle. A light rifle is the proper designation of such an arm. It is quite within manufacturing power to produce a rifle not exceeding $5\frac{1}{2}$ or at most 6 lbs. in weight, not longer than the so called "carbines" now in use, accurate and effective to very considerable ranges, certainly to 1,000 or 1,200 yards, adding greatly to the general efficiency of mounted troops. The light, sharp sabre, for the charge and pursuit, and the light, efficient rifle for other occasions both of offence and defence.

Except the sabre of the Indian horse, neither one nor the other are at present in the hands of our mounted troops.

There is no intention of advocating the employment of cavalry in duties foreign to their particular service, nothing is more to be deprecated. But when the statistics of a great war shew that little more than three per cent of the wounds inflicted on enemies are due to cavalry arms, it ought to be high time to consider whether those arms are really efficient. Apparently they are not so. The same great war, the Franco-German of 1870-71, in which it is probable that the largest masses of artillery ever brought into action were employed, and in which the relative proportion of artillery to other arms was probably greater than in any previous campaign, gives as the total result of artillery fire only 15 per cent of the losses suffered by enemies, that is to say, so far as shewn by hospital records.

It might be well here to quote the exact expressions of Dr. Billroth, addressed to the Austrian Delegations, on medical service in the field :—

"I embraced the opportunity of seeing the wounded after the battles of Weissenburg and Wörth, where a large force of artillery and also of mitrailleuses was employed; I also visited all the other hospitals later on, and frequently discussed the subject with my colleagues, and everywhere it was remarked how few were the wounds caused by artillery fire, and that there were none worth mentioning caused by cavalry weapons; cuts and stabs are the greatest rarity in field hospitals. To express it in percentages, about 80 per cent of wounds are caused by rifle fire, 15 per cent by artillery fire, 5 per cent by cuts and stabs. It was formerly said that the effect of round shot and shell was such, that men injured by them died on the spot; in 1870, the wounds of all the men were registered whose bodies were thrown into the common graves immediately after the battles, and no new proportions were arrived at."*

A statement like this coming from one of the highest and most experienced of the continental military surgeons cannot be read without serious attention.

First there is the fact that the effect of the present cavalry arms is almost inappreciable, next that the results of artillery fire even on the largest scale, represent but a small percentage of injury to an enemy. The concluding paragraph of the extract from Dr. Billroth's statement is worth particular attention, for it shows that in 1870 the wounds of *men killed* were registered before burial, and so disposes of any idea that these had been omitted in reckoning the percentages of injuries due to the action of the respective arms.

Returning to artillery. If the immense amount of its material, its expensive nature, its great trains and ammunition columns, its horses, and the forage required for them, its numerous parks and reserves, are considered, surely something more than 15 per cent of the total injuries sustained by an enemy from its action ought to be obtained.

It is not like cavalry, it can do nothing by shock or impetus, it cannot produce any effect whatever, unless by the fire of its guns, and

* *Vide* Journal of United Service Institution of India, No. 93, May, 1892.

that effect is only 15 per cent of the whole. How can it be accounted for? Nearly the whole fire of artillery, unless in the exceptional case of being closely attacked, is carefully directed and deliberate, and is carefully superintended.

Almost the only conclusion possible is, that the ranges taken by artillery are frequently too great for effective fire.

Since the war of 1870, to which this paper chiefly refers, the field artillery of all nations has been to a great extent remodelled. More powerful guns, of greater range, heavier projectiles, and higher velocities, have been introduced. The use of solid shot has become obsolete, shells of various descriptions, the most formidable of which appear to be our own shrapnel and the German ring shell, have replaced the older forms of ammunition, giving good reason to hope for results in action hitherto unattained by artillery fire.

But the test of a great war has not yet been applied. Before that war comes it is by no means improbable that the whole of the present artillery material will have undergone a further and still greater change.

Everything is pointing in that direction. High explosives, smokeless propellents, stronger and lighter guns, higher velocities and greater destructive powers, are all in the near future.

The field artillery of to-day, superior as it is to anything that has preceded it, can hardly be regarded as more than in a transitory stage.

The most powerful field gun at present in existence is probably the new pattern 12-pounder of the British service, yet it does not seem to find favour elsewhere. The advantage of extremely high velocity, for such projectiles as are now in general use, may be questioned, and there are disadvantages of increased weight both of gun and carriage entailed by heavy charges, and in limiting the amount of ammunition that can ordinarily accompany the gun. The use of brakes has been found necessary, adding considerably to the weight of the carriage and to the strain upon wheels and other parts.

It is hardly probable that the quick-firing principle so successfully introduced on board ships of war and in land defences, can ever be applied to field artillery, for the first necessity of this principle, so far as it has been tested, is a "fixed pivot," eliminating all movement of the gun due to recoil. The moment alteration of position steps in as a consequence of recoil, the entire process of running up and the laying has to be gone through, reducing the rate of fire to about its present level.

Quick-firing ammunition also is heavier, metal cases taking the place of the silk or flannel cartridges, reducing the number of rounds that can be carried by something like 15 or 16 per cent, a serious consideration in action.

And it must also be remembered that whatever the gun may be, the ammunition has still to be brought to it, round by round and at no quicker rate than individual men can supply.

It does not seem likely that any advantage can accrue from a change of this nature.

Field artillery being now almost exclusively a "shell firing service," it may be open to doubt whether extreme accuracy is altogether necessary, and even whether it has not been obtained at the sacrifice of more important qualities, such for instance as the certainty of the correct bursting of shells fired. For after all, the whole end and object is not the production of a high record of shooting, but the destruction of an enemy. The very first consideration is, how that destruction can best be accomplished.

Turning now to infantry arms, and the 80 per cent of the casualties of war that they are found to inflict. The most interesting question, and the most difficult to answer even approximately, is—How much of this 80 per cent is due to aimed, and how much to absolutely wild and unaimed, fire? The character of the arm whether muzzle or breech-loader, or magazine, has probably but little influence in the matter.

The unaimed fire finds its way, "everywhere," there is no place of safety within the limits of the range of the arm on the field of battle. It is by no means improbable, that fully two-thirds of the casualties from rifle fire are caused by shots never aimed at any particular object. At any rate if large number of troops are engaged, there is a "general effect" produced, varying in character, often extremely destructive, and quite as frequently out of all proportion to the ammunition expended.

But beyond that general effect nothing like calculation can be made. The only approach to certainly is, that the infantry best trained in peace to the use of the rifle, is likely to have the advantage in war.

Infantry arms have gone through many stages, even in comparatively recent years. The battles of the Peninsula and the early campaigns in India were fought with flint locks and smooth bore muskets.

Then came percussion arms, but still smooth bore.

The Crimean war brought in breech-loading rifles, which have since then been constantly improved upon with regard to range and accuracy.

These are now in process of replacement by magazine arms, *i.e.*, rifles capable of firing a number of consecutive shots without re-loading; there are at present no sufficient data on which to form an opinion as to their probable effect.

One of the most remarkable facts, if fact it may be called, for it is very generally asserted in relation to infantry arms and their effect in action, is that although on particular occasions tremendous losses have been inflicted in very short periods of time by the more modern arms, still the "general losses" in any great engagement have not on the whole exceeded, if they have even equalled, those of earlier days, in proportion to the numbers of men engaged.

Assuming it is admitted, it certainly points to the necessity, not so much for higher training in peace, for it would be difficult to institute anything more careful and thorough than the present musketry system of teaching, but to a different "kind" of training, less directed to the

10 THE ARMAMENTS OF THE THREE ARMS AND THEIR EFFECT IN WAR.

men themselves than to those who command them, and above all others to those who command the smallest units of fire. It is from these last that the real control and direction of fire in action must come.

The best and most improved arms are nothing, unless their use is properly controlled and directed, and this control and direction must originate, not in the largest but in the smallest units, not with the colonel, not with the captain—their duties are of supervision ; but with the serjeant and corporal standing close to his men, and directing and controlling them.

THE MOST IMPORTANT POINTS IN THE GERMAN, RUSSIAN,
AUSTRIAN, AND FRENCH REGULATIONS ON "THE ATTACK"
AND "THE DEFENCE," WITH A COMPARISON OF
THE ABOVE.

Translated from *Militär Wochenblatt* of June 29th 1892.

(Communicated by the A. Q. M. G., Intelligence Branch.)

I.—THE ATTACK.

Germany.

The German regulations make a distinction between the improvised fight and that on a prepared position; in the latter case the attack must be made in conformity with a pre-arranged plan, and preceded by a deployment; in the former case the fight is developed while advancing, the deployment of the main body is carried out under cover of the advanced guard.

The attack is divided into three parts:—

- (1) Troops are thrown forward to open fire on the enemy as near to his position as ground allows.
- (2) Strong swarms of skirmishers work their way up to these troops, and endeavour to overcome the enemy by fire. The attack has only prospect of success if superiority of fire is obtained.
- (3) If this superiority is attained the firing line reinforced by supports arrived close at hand, advances to storm the position.

This order will, as a rule, come from the officer commanding the troops, but the impulse to charge may also proceed from the firing line.

The retreating enemy is pursued with fire after the capture of the position.

An enveloping attack is recommended as conducive to success; but this must not emanate from the fighting line already engaged, but must be pre-arranged.

Russia.

The attack is divided into two parts:—

- (1) The advance.
- (2) The attack.

From the deployment into battle order about 2,000 paces from the enemy, till the time of entry within the long range zone of strong hostile rifle fire about 800 paces from the enemy, the advance is carried out by the whole line in quick time. From this point the attack is the object of all forward movements. The commander having ascertained the position of the enemy, arranged the plan of attack and reinforced the firing line, points out to the troops the right direction in which to attack.

The advance is made by rushes either of the whole line or by portions of the same. The last distance from which the firing line fires is about 300—150 paces from the enemy. From this point the assault

is made with the bayonet. Reserves advance over open ground in line with open files. When the firing line is in its last position (300—150), the reserves should not be further than 200 paces in rear of it. The reinforcement of the firing line is carried out before advancing to the attack, at 800 paces from the enemy.

Austria.

The officer commanding the troops draws up a plan for the attack. The offensive must always be adopted. If possible the attack must be enveloping, and only frontal when a surprise or approach under cover is possible, or if any other direction for the attack is not available.

Under cover of a preparatory fight the main body is deployed near to the advancing line; later on the main body is pushed forward to those points from which the real attack will commence, and at the moment of the decisive advance moves straight forward.

The principle is to approach quickly as near as possible to the enemy. At long rifle range, 2,000—1,000 paces, the advance is carried out by the whole line; at medium ranges, 1,000—500 paces, by simultaneous rushes of whole companies; from 500 paces, the decisive attack is carried out after previously shaking the enemy by fire. There must be a continuous advance the whole time. The order for the assault will as a rule come from the officer commanding the troops, but the impulse for it may be given from the firing line. At the moment before the decisive assault is made, the reserves are to be sent back to take up a rallying position on the flank, but only where stubborn resistance is expected.

France.

The assault alone can obtain decisive results.

Formations for the advance are to be chosen suited to the ground, and so as to be screened from the enemy's view. No premature deployment, and only when the enemy's fire renders it necessary is a shooting line to be extended sufficient for the opening of the fight. As soon as one is involved in a real engagement, superior force is to be deployed so as to ensure superiority. If the enemy opens fire at 700 metres it will be replied to, otherwise advancing without firing will be adhered to as far as possible. The further advance is continued from position to position, all intermixture of commands being avoided; the supports reinforce on the flanks and in the intervals. The supports are to gradually draw near to the firing line. As soon as fire reinforcements are necessary, half-sections or sections are pushed forward into the intervals, or prolong to the flanks. This insertion of reinforcements gives the impulse to a further advance.

When the firing line has arrived at 400 metres from the position, the action is carried on with the aid of the reserves, the advance being by 50 metre rushes of companies or in echelon. That portion of the firing line left in rear must not fire, if there is no interval available. At 250—200 metres bayonets are fixed, the fire increased, and directed on to the point to be assaulted. The advance of the reserve to the assault is the signal to charge, if the enemy has not already given way.

"The storm pace" is soon succeeded by the "double"; and with the cry "*en avant, à la baïonnette*", all throw themselves on the enemy. This is conducted with great spirit.

The pursuit is carried out by fire. If the attack fails, company leaders rally their companies quickly and endeavour to renew the attack, for the advance is always preferable to a disastrous retreat.

Comparison.

In all four regulations the attack is divided into three parts. The Russian regulations divide it into two, but the attack portion is again subsequently divided into two.

The first is the advance towards the position up to the opening of fire.

The second is the carrying out the fight with rifle fire, and the advance up to the storming of the position.

The third is the assault with the bayonet.

The four systems agree that the first stage is to be carried out with advanced troops, weak in numbers; the extended line going quickly forward in body as near to the enemy as possible. The Germans do not give any distance to which this first advance should be made, nor where it commences. The Russians and Austrians lay down 2,000 paces. The French regulations only order that the deployment should be carried out when the enemy's fire demands it.

The Russians consider 800 paces, the Austrians 1,000 paces, the French 700 metres (900 paces), as the distance from the enemy that can be reached on the first general advance.

For the fire fight the Germans give strong swarms of skirmishers, working their way up to the enemy at the quick or by rushes, and seeking to gain superiority of fire. The Russians and Austrians order rushes, the former to 300—150 paces, the latter to 500 paces, the former with the whole or parts of the shooting line, the latter by whole companies.

The French order rushes, company or echelon, up to 50 metres from the enemy, and deprecate the mixing up of units. The Russians reinforce the firing line at 800 paces before the commencement of the real attack. The French accept that all supports should have reinforced at 400 metres from the enemy. The Germans and Austrians are silent on this point. All four demand the shattering of the enemy by fire before commencing the assault.

All four order the assault to be carried out by the firing line aided by the reserves. The Germans bring their reserves close up for this purpose. The Russians at least 200 paces from the firing line.

With the Russians the assault with the bayonet commences from the last firing position, 300—150 paces; the French 250—200 metres from the enemy; the Austrians say the attack proper commences at 500 paces; the Germans give no distance.

Both Germans and Austrians leave the order for the decisive assault to the officer commanding the troops or to an impulse issuing from the firing line. The Russian and French regulations are silent on the matter.

All four carry out the pursuit with fire ; the French regulations provide for a renewal of a failed attack.

It is to be noted that the German regulations order the deployment before the fight ; whilst the Austrian regulations first order the deployment of the main body, and only allow later on its movement to those points from which the attack proper is to commence.

II.—THE DEFENCE.

German regulations.

The regulations lay down the following principles :—

The choice of a position and its eventual strengthening depend on the effect to be realised from the fire-arms used. The firing line will be calculated at such strength as the object in view demands. The position should be strengthened, distances measured, and marks put up, ammunition got ready and distributed, supports brought up nearer, and irregularities in the ground are to be looked to.

The number and size of the commands depends on the nature of the country, and each must be placed under a separate commander, who should tell off his own reserve.

The main reserve is to be formed up near the spot whence a counter-attack is to issue ; this is necessary in order to be successful. As a rule this spot would be near to a flank, and the larger the defending body, the more to a flank should it be placed. In this way the danger of being surrounded is avoided.

The position is first to be taken up when the direction of the enemy's attack is known.

Russian regulations.

The following are laid down as general principles :—

1.—Advantageous use of rifle fire.

2.—Then a charge with the bayonet.

In selecting positions for the defence the following should be observed :—

Cover, and distance.

Weak points should be strengthened, cover and communications obtained, and due care observed against enfilade. Ammunition is to be reserved for the shorter distances. When the enemy rise and rush forward, then the firing line is to be fired at ; in order to beat off the attack, the reserves are to fire volleys from the firing line. If the enemy does not stand, the firing line and the reserve are to charge the enemy with the bayonet, and if possible attack the enemy with a portion of the reserve on a flank. For this purpose the reserves must be brought up at the proper time. The enemy is to be pursued with fire.

When retiring, individual skirmishers are to fire, and suitable positions are to be occupied in rear. The reserves are to retire with the fighting line.

Austrian regulations.

The chief points to be observed are :—

1.—To make use of the ground.

2.—To obtain the full value of fire-arms.

The defence is always told off so as to be able to attack, if decisive results are to be attained. In choosing a position the following points are to be taken into consideration :—range, irregularities of ground, power to manœuvre. The numbers to be employed must be subordinated to the object in view. A weak defence at the beginning is a mistake. For observation patrols are to be sent out. The position must be divided into separate commands, each containing its own reserve. Individual points of importance must be occupied ; an equal distribution of troops is impossible. Independent points of resistance must have separate garrisons.

A strong reserve is to be posted to a flank. Until the intention of the enemy is known, the troops will be held in readiness. Security is to be maintained by patrols.

Reconnaissance, taking the range of certain points, and improvising artificial cover should be carried out. The reserves are to be brought nearer the firing line. As soon as the direction of the attack is known, the position is to be occupied in strength.

Long range fire will be used against columns and artillery ; at medium ranges against the most aggressive portions of the enemy, and at short ranges all available troops will be employed. If a counter-attack is intended then the main reserve is not to be employed for other purposes, and is to be deployed rapidly if the enemy has arrived at a distance where the action will be decided, then a heavy flank fire is to be opened. Finish with a charge with the bayonet. Charges by the firing line are to be avoided. If a counter-attack is not intended, the main reserve is to reinforce the firing line or engage the enemy.

The enemy is to be pursued with fire.

French regulations.

The defence derives its chief strength from fire and taking advantage of the ground. Passive defence must not be thought of. The advantages in the choice of the ground and awaiting for the enemy only as an addition to strength increase the value of an active defence, in order to defeat the enemy on known ground under favourable conditions. The commander has to consider :—

- 1.—The advantages for the offensive or defensive.
- 2.—The line of defence, points of support, and where the flanks are to rest.
- 3.—Communications from front to rear.
- 4.—Points of assembly and line of retreat.

Then the division of command and sub-divisions are to be told off, and the position strengthened.

The commanders of the sub-divisions are to make themselves acquainted with the country in front of them and the positions which may be near them ; they are to find places on which to form up, and take the range, and communicate it to their subordinates. The commanders of supports give the direction for reinforcing the firing line.

If the action is not to begin immediately, only sufficient men will be pushed forward for observation and for working parties. The main

body is to remain hidden in a position ready for action. Formations for the defence are the same as for the attack.

The front of a company is about 200 metres in length ; no uniform occupation of positions is necessary. When selecting positions for supports, it is necessary to consider where the enemy's shells and bullets are likely to fall. If the country permits of it, all irregularities in the ground are to be looked to. When the enemy approaches, the patrols are to communicate his strength, intentions, and direction of attack ; the first stand can force the enemy to deploy and reveal his intentions. The commander must then decide as to his action. As soon as the attack is made known, the position will be occupied.

Fire is opened as soon as it can be effective. The intensity of the fire is governed by distance and the importance of the targets. If the enemy approaches and increases his fire, the supports are to reinforce in succession, in order to return the fire with necessary strength. The supports are either to fit into the firing line or prolong to a flank, but never crowd the firing line. Sub-divisions can be directed to fire at reserves and supports, while the remainder reply to the fire of the enemy's firing line.

When the enemy has arrived at a distance of 400 metres from the firing line, the supports are to be generally in the firing line, and the defence will be continued in conjunction with companies in the reserve. Counter-attacks will be made by companies from the reserve.

If the attack fails, the enemy is to be pursued with fire, and the defence prepares to adopt a vigorous offensive. If the attack succeeds, companies are to disengage under cover of the detachments in close order, and collect on a place selected beforehand by the officer commanding the battalion.

Comparison.

As a general principle all four regulations agree that fire must be used to its greatest effect, and ground occupied with regard to the object in view.

With regard to the first, several different ideas prevail ; the Russians allow firing to be opened at once, the French only when the enemy can be hit ; the German musketry regulations are very meagre on this point ; as a general rule the Austrians only allow firing at medium and short ranges, and at long ranges only when sufficient ammunition is available, and the object fired at is large. All regulations, with the exception of the German, recommend that volley firing should be often employed. With regard to the choice of the position and the measures to be adopted to increase its power of resistance, all the regulations pretty well agree ; also with reference to the division of the troops into separate commands, doing away with irregularities in the ground, holding reserve detachments in readiness in a position under cover, being able to occupy the position selected for the firing line, if the direction of the attack is known, as also the separation of a main reserve behind a flank. With regard to this last point the German regulations bring prominently to notice the advantage of a movement to a flank at the same time, and lay

down that it is wrong to keep the main reserve to cover the retreat, instead of employing it during the action.

The French regulations are opposed to a passive resistance throughout, and always recommend offensive action ; the Austrian and German regulations only when success is expected ; the Russian by order of the officer commanding, if the enemy is too shaken to carry on the attack.

From the foregoing it is observed, that all four regulations generally agree in the mode of carrying out the attack or defence. Success must then fall to the best led, best trained, and best disciplined troops.

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AN ESTIMATE OF THE PROBABLE LOSSES IN THE FRONTAL ATTACK OF INFANTRY.

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I.

The following attempt to tabulate the probable fire-effect of infantry in the attack and defence can necessarily be but a very rough one. In the first place we have really nothing to go upon, for since the last two wars, when breach-loaders were pitted against breach-loaders, so much more attention has been everywhere paid to musketry training, and the troops of every nation have been trained to a system of strict fire discipline. From the range practices we can judge of the improvement which has taken place in musketry, but fire-discipline is a practically unknown factor.

Still it does not seem too much to suppose that, with good fire-discipline at the medium and long ranges, whilst the men are yet under good control and comparatively unexcited, we may get $\frac{1}{10}$ of peace results as war results.

The peace results of hits against any formation at a known range may be defined as equal to the number of yards in the dangerous space of that formation, divided by the number of paces of extension.

This was verified by some experimental firing carried out in Ceylon, in April 1891, by the regiment to which I belong. The range was 700 yards; 20 targets, $1\frac{1}{2}$ feet high and 50 feet broad, were placed one behind another at intervals of 10 yards, so as to cover the theoretical beaten zone of about 200 yards. The dangerous space of a single target being 13 yards, no bullet could fail to hit a target.

Aim was taken at the central target, 700 yards back, and 10 volleys of 80 rounds each were fired from the kneeling position.

The following series was the result per hundred rounds :—

600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790	800
1.4	2.4	4.4	3.6	3.8	6	6.2	8.2	8.6	10.6	11.4	13.4	10.6	10.4	10	9	8	7.2	5.4	4.4	4

It will be noticed that at the centre of the beaten zone the hits were 13, which correspond exactly with the number of yards in the dangerous space of the target for the 700 yards range. Therefore if the range is known, we may take the number of yards in the dangerous space of the target divided by the number of paces of extension, as peace results. If the ranges are not known exactly, these results must be divided by three. The dangerous spaces taken in the following table are calculated for men $5\frac{1}{2}$ feet high, as this seems a fairer average height than 6 feet, the height which is assumed in the musketry regulations.

The attack is supposed only to get $\frac{1}{3}$ of the result obtained by the defence, as whilst the latter would know the ranges exactly, the former would not, and consequently could not be certain of bringing the centre of the cone of fire on to the enemy.

As the present study merely embraces the frontal attack and defence of infantry as regards fire-effects, all considerations of previous preparation of the attack by artillery, or by a separate body of troops using long range fire and machine guns, and also all considerations of the numerous unexpected accidents of battle, are left out of account.

The attack is supposed to take place across flat and open ground affording no cover, the ranges of which have been found and marked by the defending force, which is also supposed to be under slight cover, such as the $\frac{1}{2}$ -hour shelter trench. A front of 100 rifles is supposed to be attacked by a force of 300 in the usual attack formation, the firing line on each side being extended to two paces.

The rate of advance is about 1,500 yards in half an hour, or 100 yard in two minutes.

The defence is assumed to lose $\frac{1}{3}$ of the losses that it inflicts.

The defence opens fire at 1,000 yards, firing one volley a minute when the enemy is advancing and affords a standing target. Fire at the longer ranges is held to be waste of ammunition, as the results would not give one per cent. of hits.

The attack opens fire at 800 yards, at which range also the defence increases its fire to two volleys a minute, firing both when the enemy is advancing and when lying down. Of course it is possible at the further ranges to fire 5 or 7 or 8 volleys a minute instead of 2, but it would seem that, taking into consideration the necessity of carefully adjusting the sights as the ranges alter, the necessity of the group and section leaders seeing that the sights *are* adjusted, and the necessity of keeping the men well in hand and preserving strict fire-discipline for the close ranges where it is all important, that it would not be wise to attempt more than two volleys a minute, which seems the utmost that is compatible with the proper observation, direction, and control of fire.

Faster firing might produce a few more casualties, but it might also have the effect of prematurely exciting and unsteading the men.

The following table gives the approximate losses at each range :—

Range.	Peace Results.	War Results.	Remarks.
1,000 ...	$27 \div 2 = 13.5$	1.4	The defence only firing one volley a minute as the enemy advance and offer a standing target extended 2 paces.
950 ...	$30 \div 2 = 15$	1.5	
900 ...	$32 \div 2 = 16$	1.6	Total 8 hits.
850 ...	$34 \div 2 = 17$	1.7	
800 ...	$39 \div 2 = 19.5$	1.9	Defence increases fire to 2 volleys a minute fired both at the standing and lying down targets. Attack also firing.
750 ...	$44 \div 2 = 22$	2.2	
700 ...	$48 \div 2 = 24$	2.4	Losses of attack = 13×26 .
650 ...	$53 \div 2 = 26.5$	2.6	
600 ...	$63 \div 2 = 31.5$	3.2	,, ,, defence = 9.
550 ...	$78 \div 2 = 39$	3.9	
500 ...	$92 \div 2 = 46$	4.6	Total loss of attack so far = 26 + 8 = 34.

450 yards.—Here volleys give way to “controlled mass fire” at the rate of 5 rounds a minute.

The defence getting 5 per cent. of hits, the attack 2 per cent.—				The attack develops its firing line to 120 rifles, and keeps it at that strength by pushing forward fresh groups.	
1st minute	91 men of Defence	fire 455 rounds = 22 hits			
2nd	120	Attack	600	= 12	The defence has no further re-inforcements, so its fire gradually gets weaker.
3rd	79	Defence	395	= 19	
4th	120	Attack	600	= 12	
5th	67	Defence	335	= 15	
6th	120	Attack	600	= 12	Losses in attack 56.
					Losses in defence 36.

350 yards.—Here the fire is increased in rapidity to 6 rounds a minute.

1st minute	55	rifles of the Defence	fire 330 rounds = 15 hits	} The attack, again brought up to 120 rifles, here begins to attain the superiority, the "useful effect" of its fire being nearly double that of the defence. Losses of attack = 31 " " defence = 42
" "	120	" " " Attack	" 720 " = 14 "	
2nd	41	" " " Defence	" 246 " = 11 "	
" "	120	" " " Attack	" 720 " = 14 "	
3rd	27	" " " Defence	" 160 " = 8 "	
" "	120	" " " Attack	" 720 " = 14 "	

250 yards.—There are only 13 men of the defence left unwounded. In the attack there are 120 in the firing line, and 16 in support.

Total losses of the attack.		124 in the firing line.
		20 in the supports (roughly).
		20 “from cover” lying down unwounded, &c.
		164 Total.

If however the attack, owing to bad fire discipline should only get 1 per cent. of hits against the defence getting 5 per cent., the results are as follows :—

450 yards.—

1st minute	91 men of Defence	= 455 rounds = 22 hits	62 of attack hit. 18 of defence hit.
2nd	120	Attack = 600	
3rd	85	Defence = 425	
4th	120	Attack = 600	
5th	79	Defence = 395	
6th	120	Attack = 600	

350 yards.—Fire increased to 6 rounds a minute.

1st minute	73 men of	Defence=438	rounds=21	hits	} 57 hit in the attack, 21 hit in the defence. Supports of attack all used up except one group of 8 men.
"	" 120 " "	Attack =720	" = 7	"	
2nd	" 66 " "	Defence=396	" =19	"	
"	" 120 " "	Attack =720	" = 7	"	
3rd	" 59 " "	Defence=354	" =17	"	
"	" 120 " "	Attack =720	" = 7	"	

250 yards.—Fire increased to 8 rounds a minute.

1st minute	52 men of	Defence=416	rounds=20	hits	} The attack has used up all its supports, and can no longer keep its firing line up to full strength, so its fire decreases.
"	" 120 " "	Attack =960	" = 9	"	
2nd	" 43 " "	Defence=328	" =16	"	
"	" 108 " "	Attack =864	" = 8	"	
3rd	" 35 " "	Defence=280	" =14	"	
"	" 92 " "	Attack =736	" = 7	"	

150 yards.—There are 28 of the defence left unwounded ; 78 of the attack—20 losses of supports and "by cover", =58.

Up to 500 yards the calculation of probable losses is simple enough, and the results are not startling, for out of 300 the attack has only lost 34 by bullets, 10 for losses among supports, 10 for losses "by cover," i.e., skulking, lying down unwounded, &c. Total 54. While the defence has lost 9 out of 100 men. This seems to show that frontal holding attacks, if not pushed within 500 yards, will not be so very costly. Under 500 yards however the attack assumes an entirely different aspect. We have really nothing to go upon, for the whole question turns upon fire-discipline, which, in its present and future developments, is practically an unknown factor.

The emotion and wild excitement of the close fire-fight will render regular volleys impossible, as in 1870, and both sides must have recourse to "controlled mass fire," as otherwise a rolling independent fire will probably break out, and all control and discipline be lost.

This rapid mass fire will depend for its "useful effect" not so much on individual aiming, of which there will probably be little, as on the grazing power of a hail of bullets kept low by the supervision of the group and section leaders.

What the effect will be it is impossible to predict, as it will depend entirely on the power of the fire-discipline to keep the fire low. Still it does not seem too much to expect that, with very good fire-discipline, we may get one hit out of every twenty bullets fired, so long as the fire is not allowed to get too rapid, the muzzles all kept pointing at the enemy's feet, and all wild firing at once sternly checked.

I have therefore taken 5 per cent. of the bullets fired by the defence at the close ranges as effective, and of those fired by the attack at 2 per cent., as the defenders are behind slight cover.

There are two courses open to the attack at this stage. One is to develop its maximum fire-effect at about 450 yards, and by pouring in "a smashing fire," seek to break down the enemy's fire resistance before attempting to cross the last zone. The other is to push forward resolutely, as fast as possible, firing rapidly with its firing line at

maximum strength and kept up by the continual insertion of fresh groups. Such an advance, in the teeth of the rapid fire of the defence with which it would be met, must necessarily be slower than before.

I have here adopted the latter alternative, as more in consonance with our present system of attack, though the former will be the more probable course in the fighting of the future.

The rapidity of fire up to 200 yards has not been allowed to exceed 6 rounds a minute, though 10 rounds a minute might be fired, because, as the whole effect depends upon the grazing power of the mass of bullets, it seems more important to keep the fire low, than to seek so great a rapidity of fire that any supervision would be practically impossible, and which might degenerate into wild, high, and comparatively innocuous firing.

Under 500 yards the firing line of the attack is brought up to, and kept up to, 120 rifles, which on a front of about 100 paces would give a crowded firing line, in some places two deep. This appears necessary in order that the attack may make use of its superior numbers to attain a superiority of fire, to obtain which at the decisive stage all considerations of extra loss must give way.

It appears that the attack, owing to its superior numbers, if it can only get 2 per cent. of hits as against 5 per cent. obtained by the defence, at the end of 5 minutes rapid firing attains the necessary superiority of fire, so that during the last minute at 250 yards the attack gets 14 hits as against 8 obtained by the defence, otherwise the "useful effect" of its fire is nearly twice as great.

When the attack has so far diminished the numbers of the defence as to attain this marked superiority of fire, the survivors of the defence will probably give up the struggle, some running to the rear, others lying down in their trench to surrender when the attack rushes in.

If on the other hand the attack, owing to bad fire-discipline, cannot get more than one per cent. of hits in the endeavour to attain the superiority of fire, they are obliged to successively use up all their supports, and after 6 minutes rapid firing, during which the effect of the fire of the defence is always considerably greater than theirs, they would either give way or dash forward to the assault, an attempt which, against the still unbroken fire of the defence, would probably be a failure.

In such an attack between 60 and 70 cartridges would be expended by both sides, if pushed straight forward as is here supposed; but of course if the attack were checked, as it might so easily be, many more cartridges might be expended.

II.—THE ATTACK WITH THE MAGAZINE RIFLE.

It is an interesting study to try to estimate the probable, or rather possible, war results with the new magazine rifle in the same manner, that is to say by supposing a frontal attack across the open by 300 men against 100, with no preparation by artillery or by long range fire, and eliminating all accidents of ground, all unforeseen incidents of battle, and all the swaying backwards of the attack which might of course greatly lengthen the fight and increase the expenditure of ammunition.

The rate of advance, as before, is calculated at 50 yards a minute, and the average height of an advancing line as $5\frac{1}{2}$ feet.

In examining the trajectory table of the Lee-Metford rifle the first thing that strikes one is that the all round result is that the shooting of the troops should be improved by 300 yards, for the trajectory of the new rifle at 1,000 yards is practically the same as that of the old at 700 yards. This of course means that in collective firing we ought now to get the same results at 1,000 yards as formerly at 700 yards.

We may, I suppose, still take the beaten zone, beyond 600 yards, as of much the same depth and breadth as formerly, for however improved the weapon, the personal errors of the men still remain, and the bullets of a volley will therefore probably open out into much the same cone of fire as before. If this is correct, then the results of peace firing should still roughly equal the number of yards in the dangerous space of the target divided by the number of paces of extension; and the probable war results beyond 500 yards, while the men are comparatively cool, may still be taken as $\frac{1}{10}$ of these peace results.

In the trajectory table of the Lee-Metford the furthest range considered is that of 1,000 yards; as however the new trajectory at 1,000 yards is equal to the old at 700 yards, it seems fair to assume that the new at 1,300 yards is equal to the old at 1,000 yards. If this is correct, then the long ranging powers of the new rifle cannot be used against an extended line beyond 1,300 yards without waste of ammunition, (*i. e.* less than 10 per cent. of hits in peace or 1 per cent. in war), unless exceptionally favourable targets appear. We may therefore regard the fire of the defence, if the ground is favourable, as being opened at 1,300 yards, and that of the attack at 1,000 yards, at any rate it is not safe to leave fire at these ranges out of account in an attempt to estimate possible war results. The new rifle being sighted up to 2,900 yards, the temptation to employ fire at still longer ranges will doubtless be great in defence, but no attack was ever stopped by long range fire, and in the future, as in the past, the struggle will have to be decided by the heavy losses inflicted at the close ranges. Long range fire entails a heavy expenditure of ammunition for comparatively small results, whereas with magazine rifles the consumption of cartridges will be so very great at the nearer ranges, that it will be more than ever necessary to husband our ammunition for the close fire fight. Still if at 1,300 yards we can count on 1 per cent. of hits, it cannot be regarded as waste of ammunition to open fire, if the defence has facilities for replenishing their pouches.

It is very difficult to calculate the fire-effect of the new rifle at the further ranges, because smokeless powder has rendered the "direction" of the fire so much easier, that it will probably in the future be concentrated, not on the firing line in general, but on those parts of it which present favourable targets, and which will now be visible instead of being shrouded in smoke as formerly.

For instance, if the firing line of a battalion converges too much towards the central point of attack, as may often happen, magazine fire will now be at once turned on to that part of the firing line thus crowded,

and which will be clearly visible. Again, it is said that when troops are struck by a heavy fire, they tend to collect in groups on either side of the ground beaten by that fire: such groups crowded together will now be visible, and magazine fire at once turned on to them.

Again, General Skobelev states that the advance of a firing line really depends on the progress which, thanks to circumstances, a few brave men make advancing in isolated groups, which groups are afterwards joined by their irresolute comrades; and he recommends that the advance of such groups be carefully watched for and at once overwhelmed with fire, as by their destruction it is possible to destroy, in the germ, the initiative force of the rest of the mass. This seems to argue bad fire-discipline on the part of the attack, but if it is correct, there is no doubt that such groups being now visible, can be overwhelmed with magazine fire.

Another point which will tell in favour of the defence is that it will now be possible for a small fire-unit, if a good target appears, by aid of the magazine, to rapidly fire the 100 or so bullets required to form a good beaten zone and cover errors of range.

Again, the supports will be clearly visible, and if they are at all badly led or exposed, it will be possible for the officers directing the fire of the defence to neglect the hostile firing line for the short space of time now required to overwhelm them with magazine fire.

This increased visibility of the attack, in all its movements, mistakes, and re-inforcements, will enable the defence to make full use of the magazine rifle as a weapon of opportunity, and to thus take prompt advantage of all the incidents of battle.

In order to get full advantage from the magazine rifle it will be necessary that the troops be trained in a still better and stricter fire-discipline than at present, so that the "control" of the fire can be trusted entirely to the group and section leaders, and the officers be enabled to devote their whole attention to the movements of the enemy and the consequent "direction" of the fire.

In the following table an attempt is made to estimate the probable effect of the new rifle in action. Until we know more about the magazine rifle, and until we have the results of experiments on varying ground against the various battle formations, such an attempt cannot of course be anything but a very rough one.

1,300 yards ...	27 ÷ 2 = 13.5.....	1.4	{ The defence only firing one volley a minute as the attack advances and offers a standing target ex- tended two paces. Total losses of at- tack 12 men hit.
1,250 " ...	$\frac{30}{2}$ = 15	1.5	
1,200 " ...	$\frac{32}{2}$ = 16	1.6	
1,150 " ...	$\frac{34}{2}$ = 17	1.7	
1,100 " ...	$\frac{36}{2}$ = 18	1.8	
1,050 " ...	$\frac{38}{2}$ = 19	1.9	
1,000 " ...	$\frac{40}{2}$ = 20	2.0	
1,000 " ...	$\frac{48}{2}$ = 24	2.4	

					{ The defence in-
					creases its fire to two
					volleys a minute, firing
					both at the standing
					and lying down tar-
					gets.
950	"	... $\frac{5.3}{8}$	= 6.5.....	.7	The attack also
900	"	... $\frac{5.8.5}{8}$	= 29.2.....	2.9	opens fire at 1,000
850	"	... $\frac{6.6}{8}$	= 8	... .8	yards at the same rate.
800	"	... $\frac{7.1.6}{8}$	= 35.7.....	3.6	Losses of attack
750	"	... $\frac{8.0.7}{8}$	= 10	.....1	(23.9 × 2) = 47.
700	"	... $\frac{9.0}{8}$	= 45	.....4.5	Losses of defence
650	"	... $\frac{1.3.2}{8}$	= 16.5	...1.7	$\frac{4.7}{3} = 16.$
600	"	... $\frac{1.7.4}{8}$	= 87	.....8.7	Total loss of attack
					from 1,300 yards
					(47 + 12) = 59, plus
					losses suddenly inflicted
					on crowded parts
					of the firing line, which
					will now be visible,
					say 11 (59 + 11) = 70.

The attack has now worked its way up to 600 yards from the position by a steady advance, during which it suffered very heavy losses, 70 men out of 300. Though the defence has gained so much by the increased range and absence of smoke, it does not appear that the attack gains much. The defence in neutral-tinted uniforms behind slight cover will be very difficult to see at the longer ranges, and consequently the direction of the fire will be very difficult, so that it seems that 16 out of 100 men represent fairly the losses of the defence up to 600 yards.

At 600 yards the trajectory is nearly flat, and the attack suffers so heavily in the advance from 650 to 600 yards, that it would be impossible to advance beyond this point till the enemy's fire-resistance is more or less broken down, as the losses in an advancing (*i. e.* standing) target would be too great. The attack, though still numbering 230 men against 84, cannot afford to receive 8 per cent. of the enemy's bullets as it advances. Before a further advance can be attempted, it is first necessary by a continuous hail of magazine fire, to so destroy the control and direction of the enemy's fire, the morale, nerves, and aiming power of the men, that the enemy will be lucky if, by strict previous training in fire-discipline, instead of 8 they can obtain 1 per cent. of hits.

We may therefore assume that at 600 yards the attack halts, and increasing its firing line to 120 rifles per 100 yards, makes an effort to break down the enemy's fire, and prevent them showing their heads above the trench by pouring on to them a hail of magazine bullets.

The attack henceforth relies upon its superior numbers to be able to keep its firing line at full strength by constantly inserting fresh troops, while gradually by continuous rapid fire reducing that of the enemy.

We also assume that volleys will here be found no longer possible, even of the smallest units, as amid the noise, confusion, and excitement, words of command could not be heard, especially as most officers' voices will probably by this time have "gone," so that recourse will be had to controlled mass fire.

The strictest fire-discipline will be necessary at this stage, in order to prevent, as far as possible, wild firing, to keep the fire low, and to husband the ammunition. It will be most difficult to bring up fresh supplies of ammunition to the firing line, for as any parties so employed will now be visible to the officers directing the fire of the defence, the fire will be at once turned on to them. Later on, however, when the fire of the defence has been shaken, it may be possible.

In order to strengthen this all-important fire-discipline, it will probably be necessary that battle-police follow in rear of the attack, to prevent men skulking under cover, carrying wounded to the rear without orders, &c.: all men so discovered to have their names taken and be afterwards punished for cowardice. By this means it may be possible to minimise the "losses by cover."

Two courses are now open to the attack. One is to remain at 600 yards until a mastery has been obtained over the hostile fire, and the enemy has been so reduced in numbers, and so shaken in discipline and morale, that their fire will be comparatively innocuous. The other course is, after about five minutes rapid fire, to rush in with a cheer to 500 yards, and from thence to pour in a finally decisive fire. The former would appear the safest plan, as the hostile fire would not be sufficiently broken down, by five minutes rapid fire at 600 yards, to allow of a further advance without heavy loss. But its real expediency is doubtful. In the first place such a long delay would deprive the attack of its offensive aspect, and proportionally encourage the defence. In the second place after five minutes the rapid fire would become wilder and the fire-effect proportionally smaller each minute, and it is doubtful if the men could be got to stay there so long. Colonel von Scherff says (Mayne's "Fire Tactics"). "The physiological influence of a rapid fire on the nervous system of the combatants is such that, at the end of a very short time, which cannot reasonably last more than five minutes, the troops on the offensive will either dash forward or retire." Again, an advance from 600 to 500 yards at this stage, though costly, would probably have a great moral effect on the defence, as showing that the attack is by no means stopped, and as threatening the defence with annihilation if they do not retire, for a retirement carried out under 500 yards would be terribly costly.

At 600 yards there are of the defence 84 men left, and of the attack there are 230, or 120 in the firing line, and 110 in support ready to fill up vacancies.

We may suppose that on both sides an effort is made at first to restrict the rapidity of fire to, say, seven rounds a minute, so as to retain control as long as possible. Also, that at this rate of fire the defence can still get $\frac{1}{16}$ of peace results, and as the attack can now clearly see the enemy's heads and shoulders when they fire, that they get about $\frac{1}{20}$ of peace results.

In the first minute therefore there are,

In defence 84 men firing 7 rounds a minute = 588 rounds at a lying down target practically in close order. They get $\frac{174}{4 \times 10} = 4$ per cent. of hits = 23 hits a minute.

In attack there are 120 men at 7 rounds a minute = 840 rounds. They get $\frac{174}{4 \times 2 \times 20} = 1$ per cent. or 8 hits a minute.

In the second minute,

The defence has 76 men at 7 rounds = 532 rounds.

at 4 per cent. = 21 hits.

The attack has 120 men as before and gets 8 hits.

In the third minute,

The defence has 68 men at 7 rounds = 476 rounds.

at 4 per cent. = 19 hits.

The attack has 120 men and gets as before 8 hits.

In the fourth minute probably the firing would become wilder and more rapid, the control more difficult; many of the officers and section leaders would be wounded, so if we regard the fire as now losing about half its accuracy, as the wild excitement of the close fire-fight sets in, we probably shall not be far wrong.

In the defence 60 men at 10 rounds = 600 rounds.

at 2 per cent. = 12 hits.

In the attack 120 men at 10 rounds = 1200 rounds.

at 5 per cent. = 6 hits.

In the fifth minute,

In defence 54 men, say at 12 rounds = 648 rounds.

at 2 per cent. = 13 hits.

The attack has 120 men at 12 rounds = 1440 rounds.

at 5 per cent. = 7 hits.

The attack may now either remain where it is, if possible, till the enemy's fire is overcome,—or rush forward. Let us follow first the former case.

In the sixth minute,

The defence has 47 men at 12 rounds = 564 rounds.

at 2 per cent. = 11 hits.

The attack has 120 at 12 rounds = 7 hits.

In the seventh minute,

We may regard the fire as getting wilder, and many men as merely loosing off to shoot up their courage by making a noise, so we can again lessen the percentages.

The defence has 40 men at 12 rounds = 480 rounds.

at 1 per cent. = 5 hits.

The attack has 120 men at 12 rounds = 1440 rounds.

getting 1 hit in 300 rounds = 4 hits.

In the eighth minute,

The defence has 36 men at 12 rounds = 432 = 4 hits.

The attack as before has 120 men and gets 4 hits,

and is now equal to and beginning to master the fire of the defence.

In the ninth minute,

The defence has 36 men at 12 rounds at 1 per cent. = 4 hits.

The attack has 120 men as before who get 4 hits.

In the tenth minute,

The defence has 28 men at 12 rounds = 336 rounds.

at 1 per cent. = 3 hits.

The attack has 118 men at 12 rounds = 1416 rounds.

= 4 hits.

The defence is now so reduced in numbers, that the fire of the attack has obtained the mastery, most of its leaders would be down, and the remaining defenders would probably give way if the attack now rushes in with a cheer.

It is however extremely improbable that the attack would remain for so long as ten minutes at 600 yards. In the first place so long a delay would, by delaying the decision of the fire-fight, really increase the losses. It would also lose the moral effect of an advance, and the chance that such an advance may induce the enemy to retire while a retirement is still possible. Also if the rapid firing lasts longer than five minutes, the men might lose heart and suddenly give way; or they might rush forward without orders, led by their desire to get at the enemy the moment his fire slackens. ("This betrayed itself by a slackening of the enemy's fire, upon which the whole line at once rushed forward." Von Boguslawski.)

We may therefore consider the more probable course to be that after five minutes rapid fire at 600 yards, whistles are blown all along the firing line of the attack, the fire ceases, and they rush forward with a cheer to 500 yards.

If possible this advance might be by half the firing line covered by the fire of the other half. But it would require very strict discipline to keep back half the firing line at this stage when their comrades are rushing to the front, especially as "a great part of the men cannot hear the word of command, and officers can only influence by their conduct and example." (Von Boguslawski.) The men would now be very much excited and out of hand, the rage of battle, the desire to get at the enemy and finish the business, and the force of example would all tend to make the firing line rush forward all together.

The defence would now have 47 men left out of 100, the attack has left 120 in the firing line, 22 in support.

The sixth minute.

After five minutes the attack rushes forward, taking say $\frac{2}{3}$ of a minute to pass over 100 yards. It is possible that if this rush be resolutely carried out, the defenders may bolt back at the same time, for they will have now lost more than half their number, including many of their leaders, and will know that if they do not retire before the enemy has established himself within the 500 yards of flat trajectory, they will probably be shot down if they attempt to do it later. The attack may therefore possibly be victorious at this stage.

Supposing however that the defenders remain to fight it out. As the attack rushes forward it offers a standing target, so instead of 1 per cent. we must regard the defence as getting 4 per cent. of hits.

47 men at 8 rounds ($\frac{2}{3}$ of a minute) = 376 rounds.

at 4 per cent. = 15 hits.

The attack does not fire, but lies down again at once on reaching 500 yards.

The seventh minute,

The defence has 47 men at 12 rounds = 564 rounds.

at 1 per cent. = 5 hits.

The attack has 120 men at 12 rounds = 1440 rounds.

at 1 hit in 300 rounds = 4 hits.

The last support of the attack is now merged into the firing line.

The eighth minute,

In defence 42 men at 12 rounds = 504 rounds.

at 1 per cent. = 5 hits.

The attack has 122 men at 12 rounds = 1464 rounds.

at 1 in 300 rounds = 4 hits.

The ninth minute,

The defence has 33 men at 12 rounds = 456 rounds.

at 1 per cent. = 4 hits.

The attack has 117 men at 12 rounds = 1404 rounds.

at 1 per 300 rounds = 4 hits.

The tenth minute,

The defence has 34 men at 12 rounds = 408 rounds.

at 1 per cent. = 4 hits.

The attack has 113 men at 12 rounds = 1356 rounds.

at 1 per 300 = 4 hits.

The eleventh minute,

The defence has 30 men at 12 rounds = 360 rounds.

at 1 per cent. = 3 hits.

The attack has 109 men at 12 rounds = 1308 rounds.

at 1 per 300 = 4 hits.

The attack has now mastered the fire of the defence, that is to say that, besides having a far greater volume of fire it is now getting a greater useful effect every minute, or more hits among the defenders. The latter have now lost considerably more than $\frac{2}{3}$ of their force, 26 men only being left out of every hundred. For ten or rather for eleven minutes they have faced a continuous and overwhelming hail of magazine bullets without being able to stop the attack, their officers would be mostly wounded, their morale broken, and it would seem that they have reached the limits of endurance, and they will probably now seek safety by retiring before the enemy gets so close as to make retirement impossible.

The foregoing figures do not pretend to give anything but the very roughest approximation to possible war results, and would probably be greatly altered by the realities of action. But even such an approximation, considered in conjunction with the conduct of the infantry in 1870, gives us something to go upon in endeavouring to forecast and prepare for the fire-tactics of the future.

It may be objected that the percentages of hits taken are too small, both at the further ranges where the men are comparatively cool, and at the closer ranges where the trajectory is now so flat. But even with the percentages taken the losses are very heavy, amounting to nearly $\frac{2}{3}$

of the attacking force, and to more than $\frac{2}{3}$ of the defenders. Also in 1870 the well-drilled German infantry fired 30,000,000 rifle bullets, while of the 35,000 French killed, 70 per cent. were by rifle bullets, which gives a result on an average all through the war of 1,224 bullets required to kill a man. Also it is said that it required 300 bullets to wound a man, though the Germans as a rule reserved their fire to within 400 yards. As regards the further ranges, it must be remembered that the attacking force will probably have marched a considerable distance previously to coming into action, they will be more or less tired, and, firing at unknown distances, can scarcely hope to bring the centre of their cone of fire on to the enemy, besides having only a small disappearing target to fire at. As regards the defence, though the ranges will be known, yet they have to fire at an advancing extended target, and their aim will be disturbed by the enemy's bullets falling about their heads. Von Boguslawsky, speaking of long range fire when attempted in defence by the Prussians, says, "Even on our side hurry and excitement might often be noticed. A good many soldiers fired into the air at long distances; a good many fired into their friends in front, notwithstanding our careful musketry instruction."

As for the small percentages at the close ranges, it must be remembered that the state of men after a short period of rapid fire is one of half-mad excitement, and that under such circumstances men *will* fire high; and we may refer to the fact that many of the rifles thrown away by the French in their flight from Wörth and Spicheren were still sighted up to 800 yards though they had been fighting at the close ranges; also that such things are not unknown even at field days in peace. Though weapons change, human nature remains the same, and in the close fire-fight the mass of bullets will probably go overhead as formerly. Again it was proved in the Belgian experiments on rapid fire in 1883, as given in Mayne's *Fire Tactics*, that the accuracy of a rapid fire decreases in proportion to its duration, even in peace.

Taking the figures here given therefore as in some sort a fair measure of what we may expect, let us examine how they bear on some of the points of fire-tactics.

First, as regards the vexed question of long range fire. We may take as one of the most recent utterances on this subject that of the late General Von Schellendorf:

"We have to consider the enemy as covered, that is as a small changing disappearing target. What results a long range fire will give at such a target, a glance at the musketry tables will show. But a fire without results is not only physically resultless, but raises the moral factor of the enemy. Nothing remains therefore but to advance, as far as possible without firing, and in an appropriately chosen formation, close to the enemy, till forced to halt by the enormous losses in question, that is until the leading loses its influence in front. Long range fire appertains to the artillery. Our infantry rifle must only exceptionally be used as a long range arm. Therefore without long range fire, and without halting, on towards the enemy to within close range, which will bring to bear our fine arm and our improved musketry training."

This applies of course only to infantry supported by artillery fire. But even then it would appear worth while for the advancing infantry, if the ground is open, to fire two rounds a minute between 1,000 yards and 600 yards. Taking into account that the target is a small, changing, disappearing one, and therefore considering the attack as only getting $\frac{1}{30}$ of peace results in the open, we still find that between 1,000 and 600 yards the attack destroys 16 per cent. of the defence. This is a clear gain in two ways, first because such a fire would rattle about the enemy's ears and disturb their aim, secondly because if these 16 per cent. are not hit we must add them on to the defence at the close ranges. Let us take as an instance of what would be the result, the moment when the attack rushes forward from 600 to 500 yards.

In the one case we have,

The defence has 47 men at 8 rounds ($\frac{2}{3}$ of a minute) (= 376 rounds)
at a standing target; at 4 per cent. of hits = 15 hits.

In the second case we have,

The defence has 63 men at 8 rounds (= 504 rounds)
at 4 per cent. = 20 hits.

In the same way all through the rapid close fire-fight at 500 yards it will be found that this addition of 16 per cent. to the strength of the defence would materially increase the losses of the attack and proportionally delay the decision. It would therefore seem advisable for the attack to open fire when the ground permits, at the ranges under 1,000 yards, in order first to disturb the aim of the defenders, and secondly to put as many of them out of action as possible before entering on the decisive fight at 600 yards.

Secondly, let us examine the question of extended firing lines, or closed fire-units, as advocated by the author of "A summer night's dream" with the object of obtaining stricter fire-discipline. We find that even with a firing line extended two paces the losses of the attack between 1,300 yards and 600 yards amount to 70 out of 300 men. If the line is closed and there are no intervals for the bullets to pass through, we must multiply the loss by two ($70 \times 2 = 140$) or 70 more men hit. Let us again see the result of such extra loss on the close fire-fight at 500 yards. Take the third minute when the last supports of the attack have been absorbed.

In the one case it stands,

The defence 38 men at 12 rounds = 456 rounds.
at 1 per cent. = 4 hits.
The attack 117 men at 12 rounds = 1,404 rounds.
at 1 in 300 = 4 hits.

In the second case it stands thus,

The defence 38 men as before who get 4 hits.
The attack ($117 - 70 =$) 47 men at 12 rounds = 564 rounds.
at 1 in 300 = 1 hit or nearly 2.

Thus at this critically decisive moment we find the attack instead of equalling and about to master the fire of the defence, still only getting a fire-effect which does not even half equal that of the defenders. The result cannot be doubtful, namely the repulse and destruction of

the attack (unless four times the numbers of the defence). Therefore apparently such closed fire-units cannot be used with any prospect of success.

Thirdly, as regards the method of advance. The losses of the attack at the medium ranges are so deadly that the only method of bringing up a strong firing line to the decisive ranges, appears to be for a thin firing line to be led resolutely forward, firing as it advances to disturb the enemy's aim. This line to lie down at 600 yards and open a rapid fire, under cover of which the supports can be carefully led up according to the ground. The firing line to be then increased up to the density required to bring about the decision, and kept at this required density by the constant sending up of fresh fire-units from the supports as gaps are observed.

Fourthly, the heavy losses between 700 yards and 600 yards seem to point to the fact that in retreating actions, such as those of outposts retiring, or a rearguard fight, the retirements should be carried out when the enemy is between 700 and 600 yards off, instead of 300 yards as heretofore.

Also that demonstrative or retaining actions should not be pushed further than 700 yards roughly, unless it is absolutely necessary to hold the enemy fast at whatever sacrifice of men. For instance a frontal attack, in combination with a flank attack, should apparently not push forward beyond 700 yards till the flank attack begins to make itself felt.

Fifthly, as at 600 yards the enemy, if unbroken in morale, ought to get 8 per cent. of hits against an advancing line extended two paces, which with 100 men firing 7 rounds a minute, would mean a loss to the attack of 50 men or so during the advance from 600 to 500 yards, it is manifestly impossible to advance beyond this point till the enemy's morale is broken and his fire becomes wild. In our attacks on the parade ground therefore we ought to recognize this fact, and accustom our men at 600 yards or so to halt, and, the firing line being thickened up to 120 men per 100 paces roughly, pour in a rapid fire for five minutes. Otherwise on being checked at this stage in action, they may fancy that the attack is being stopped and lose their offensive spirit, or make a wild attempt to rush on as they have been taught. It creates false impressions to continue the advance at this stage as if the enemy's fire were non-existent, which may lead to its being attempted in action with disastrous results.

Sixthly, we should recognize the fact that at this stage the strength of the attack lies in utilizing its superior numbers to pour on to the enemy a superior and ceaseless hail of magazine bullets, and therefore give up the attempt at this stage to enforce volleys on the parade ground, training our men instead to controlled mass fire, such as they will use in action. A body of men so trained during peace would surely in action be superior both in confidence and in fire-discipline to troops accustomed during peace to rely on volley-firing up to the moment preceding the assault, which volley-firing they would find impossible at 600 yards with the new rifle, and consequently would be compelled to fall back on a system of firing which they have not practised.

Such mass fire might be practised for a short time on every parade, till the men thoroughly understand it as the fighting fire under 600 yards, and are accustomed to aim low and fire rapidly, to cease it at once on the whistle sound, and to look round for orders or signals.

Seventhly, as regards the expenditure of ammunition. We find that in such an attack the attacking force fires roughly 120 rounds and the defence roughly 140. But the attack here considered is supposed to be pushed straight forward, aiming at as rapid a decision as possible. In action many circumstances might occur which would keep the men under fire much longer, and consequently lead to a larger expenditure of ammunition at the further ranges. An attacking force might have to resist a counter-attack after capturing the position, or attack a fresh position in rear before its pouches could be replenished. In defence the repulse of one attack would by no means end the business, and the men must have ammunition to repulse a second and even a third or fourth.

In the war in Chili 1891 the ammunition question came strongly to the front. Detachments of the Congress troops are said to have fired away all their ammunition, 150 to 200 rounds per man, in from half to three-quarters of an hour. At the end of the fighting on the 21st August it appears that the infantry had only five or six rounds left per rifle, though they all began with 180; that is they were practically defenceless against fresh troops. Of course they were not trained in fire-discipline, but still the fact remains that the expenditure of ammunition was enormous. In 1878 the X German Army Corps, trained to fire-discipline, fired from 100 to 120 rounds in from 3 to 4 hours' manœuvres. What would they fire with the magazine rifle? It all seems to point to the fact that the soldier on going into action must have, on his person, not less than 200 rounds. The only method for replenishing the pouches of the firing line of the attack which can be carried out under magazine fire, appears for the fresh supply to be issued to the supports, and carried up by them when they re-inforce.

Lastly, the result of a general examination of these figures appears to be to completely disprove the oft-repeated observation that frontal attacks are now hopeless. On the contrary we see that an attack made in a proportion of three to one, though the losses will be heavy, amounting to nearly $\frac{2}{3}$ of the force, ought not only to succeed, but to almost annihilate the defenders if they remain for the close fire-fight. On the other hand an attack only twice the numbers of the defence appears to have no chance, unless prepared and supported throughout by artillery fire. Its only chance of success would be to utilize its superior numbers, either so as to be at least three to one at the decisive point, or by enveloping a flank.

As regards the decisive fight under 600 yards, we see that a difference of even 1 per cent. in the shooting will produce most important results; while if one side could shoot two per cent. better than the other, the combat would probably soon be decided in their favour, unless the enemy possessed an immense preponderance in numbers. This difference is to be obtained only by stricter fire-discipline and battle-

training, and by accustoming our men to controlled rapid fire till it becomes a sort of second nature to them to fire low, on their doing which in action the whole thing depends.

In this paper it has been assumed that troops can be trained to a fire-discipline sufficiently strict, backed up by an efficient battle-police, to carry them all, or nearly all, forward in the teeth of a modern fire; though it is known that in 1870 the dissolving effect of the weapons of that day was so great that all formations were speedily broken up, that the battle-fields were covered with stragglers, and with men skulking behind cover. That the difficulty will be great was proved in Chili, where the magazine rifle is said to have brought the attacks to a standstill at about 1,000 yards. It is also assumed that fire-discipline will greatly avail to overcome that constant swaying backwards and forwards of the attack on which Von Boguslawski so strongly insists.

Whether such things are possible, whether fire-discipline can so far overcome the nerves of men and the dread of death, under the future hail of bullets, remains to be seen. But there can be no doubt that fire-discipline will be the dominant factor in the infantry fight, and therefore, to those who will be in the firing line, its importance seems so great, that beside it all other infantry questions (except marching) seem of little consequence.

If we wish to compensate for our numerical inferiority as compared with foreign nations, a superiority of fire-discipline will to a great extent suffice, as far as the infantry fight is concerned. It is said that under modern fire the "losses by cover" equal the losses by fire; if therefore we can do away with "losses by cover," we double our numbers. Also if at the decisive ranges we can manage to so keep our fire low, as to get 5 per cent. of hits, while the enemy are only getting 1 or 2 per cent., we double our numbers again. Then one of our companies may hope to get to the bottom of two, three, or even four times its own numbers.

But it must be a fire-discipline of our own, not following but ahead of other nations, as our discipline was in the Peninsula. A fire-discipline begun as soon as the recruit has a rifle put into his hands, and continued side by side with his training in ordinary drill, and with equal frequency and strictness, both on smooth ground and on rough.

THE CURVED SWORD IN THE NATIVE CAVALRY.

By Captain W. D. THOMSON, 1st Bengal Cavalry.

The annual competition for prizes for mounted combat, which is held every December, being just over, the attention of most officers of Native cavalry has recently been called to the immense improvement which has been made in this most necessary branch of a cavalry soldier's training.

Though the system of teaching mounted combat in Native cavalry, is the same as in British cavalry, there is one point which will make an immense difference in the result of this teaching, namely that Native cavalry is armed with a curved sword.

The question of whether a curved sword or a straight one is the best, is as hopeless a one to decide as the famous Indian dispute about the long and short hogspear, but as all Native cavalry is armed with a curved sword it seems reasonable to assume that a curved sword has been found best for it, whatever may be best for Europeans. This being so, we should consider. (a) What a curved sword should be like. (b) How its use should be taught.

The curved shape of the blade itself indicates that more results can be got from it by a drawing cut which will bring into use the whole of the edge, from near the hilt to within a few inches from the point, than from any other cut. If only a straightforward cut is used more like the blow of a hatchet than anything else, no advantage is taken of the curved shape of the blade; any straight sword with equal breadth and weight in the back would do as well, and would be much better to point with, but a drawing cut is necessary to get the value out of a curved blade.

This is self-evident to any one who takes a curved sword in his hand. This being the case, the next thing to consider is what shape of curved sword will give the most efficient cut. A good drawing cut would begin about 6" or 7" from the hilt, and be drawn up to within a few inches from the point, therefore the blade must have a certain weight throughout this part. To get this, the blade must be broad throughout this part, and have enough weight to draw the edge through without any great effort on the part of the wielder. In an European sword, the part next the hilt (the forte) is always heavier than the rest of the blade, but if a curved sword were made so, having regard to the absolute necessity for weight half way up, the weight next the hilt would be so great that the sword would be unweildly. Thus we arrive at the fact that the curved blade should be slightly broader and heavier in the middle than near the hilt, being only strong enough at the hilt to ward off of a blow; the heavy part, beginning about six inches from the hilt, should run up to within 3" or 4" from the point, and then be tapered from the edge and not from the back. This is the shape of blade of all the celebrated historical swords in India, is the shape which has

always made the greatest havoc amongst our ranks, and is the shape of the swords used by the men across the frontier (when they use swords and not knives), who are the real swordsmen of the day, and who literally live by their weapons. So much for the shape of the blade. The next consideration, and one nearly as important, is the shape of the hilt. This is the worst part of the sword in most Native cavalry regiments. Most regiments have a good broad curved blade answering well to what is required, but very few have retained the necessary kind of hilt for getting the maximum of effect out of the curved sword.

The first remark an European makes on taking up a tulwar, is that the hilt is too small in the grip, he has been accustomed to the European foil handle which is more or less round or oval, and about an inch and a half longer than the clenched fist of the holder. This is of no consequence in a pointing sword, but is absolutely fatal in a curved one. The sword turns in the hand just as a round handled polo stick does, and instead of the edge leading truly it is the slightest thing thrown out. The grip of a curved sword should be flat or nearly so, with shallow grooves in it for the fingers; the grip should be only just big enough for the hand, which should feel wedged into it. This will insure the edge leading. It is better to be too small than too big. With this kind of hilt it is nearly impossible to make any kind of cut except one in which the edge leads. Any room for play of the hand in the grip means probability of the edge turning.

Native experts are not quite unanimous as to whether it is necessary for the hilt to end in a flat disc shaped piece of iron, or whether a single piece of steel running in front of the knuckles, from the bottom of the hilt to where it joins the blade, is sufficient. But all are agreed that the round disc, though extremely uncomfortable for the wrist, when doing anything like sword exercise or similar "in the air" practices, is of the greatest use in forcing you to keep your edge straight and obliging you to draw your cut instead of making it like the blow of a bludgeon.

Also any kind of hybrid sword with curved blade and a foil hilt is bound to be a failure. The wielder can neither fence, point, nor cut with it.

With the proper pattern of curved sword it is evident that nothing like fencing could be done, especially when there is a round disc on the bottom of the hilt. The weight being so far forward, the balance prevents your either, what is known in fencing language, "binding" your adversary's sword with it (namely, getting the forte of your own sword over the feeble of his, and twisting it by sheer strength of wrist so as to prevent him disengaging and lunging), or yourself making the rapid disengage and lunge which is so effectual with the rapier. Even if you could make this disengage and lunge it would have very little effect, as the lunge would be with the curved blade. The swordsman then must be content to simply guard and feint, until he sees a chance of getting a cut at his enemy, when the slightest touch with a sword of the above description would give such a wound that very little more would be needed. That such were the tactics followed by the Sikh and all the irregular cavalry we have met

before the mutiny, is clearly shown by Major Elliot in a pamphlet written lately on this and kindred subjects ; * who shows that it was chiefly the sword, and not the skill of the user, which made the Sikh cavalry so deadly at Aliwal. Whether it was so or not, there is no doubt that pursuing the above tactics, the Sikh cavalry inflicted such loss on us as had never before been suffered by British cavalry, fighting sword against sword. Nolan, on the same subject, in his book on cavalry tactics, said he found on enquiry that the men who cut up our regiments so in the Sikh wars were taught no regular sword exercise, but that they owed it all to the terrific power of cutting which the curved sword with a suitable hilt gave them. The above quoted pamphlet of Major Elliot's gives many more testimonies to the same effect. Similarly in pursuit, though the straight sword may reach a flying enemy a foot before a curved one, when the curved one is within arm's length the rider has only to lay his edge on the flyer to cut him to the middle.

To turn next to the best way of teaching the use of the curved sword. The sword exercise as taught at present is probably well suited for the sword used by European cavalry, especially as regards the guards and points, but does exactly the same sword exercise suit a pointing sword and a cutting one? That some kind of sword exercise is necessary is obvious, as the recruits we now get from the east of the Indus, as they have not been accustomed to handle a sword from their youth up have to be taught to cut clear of their horses, and the horses must be taught to be steady under the sword, and to go up readily to an adversary armed with a sword. I think no one will question the fact that a scimitar shaped sword is unsuited to a rapid point. In the first place, if the lunge or time thrust is made straight, the point of the sword will strike some inches off the place aimed at, if it strikes at all, which is doubtful in the case of a point at the face. The only hope would be to aim off the point you want to hit, which in the hurry of a *mêlée* would be quite impracticable. In the second place, if it does strike it will do very little damage, and in the third, if a hard thrust is made the curved blade will be seriously bent and injured. In the yearly competition in mounted combat in my squadron, which is just over, two out of the three men left in last had won all their ties by straight thrusts at the face, which if given sharp and hard is a very difficult stroke to parry, but it was evident that in each case, if the man had had his own sword instead of a straight single-stick, they would not only not have hit their adversary at all, but having by this point which could not have succeeded with their own sword, let their adversary inside their own guard, they would have let themselves in for the certainty of a terrific and fatal cut in return. The men see that the point pays in a competition with a straight stick, and naturally practise a form of attack, which with the tulwar would not only not harm their adversaries, but would inevitably damage their own weapons.

Having regard to all these things. (a) Is it wise to teach Native cavalry to point at all?

* Notes on Cavalry Literature, treating more especially of its armament, by Major G. H. ELLIOTT, 3rd Bengal Cavalry. Pioneer Press, 1890.

(b) Are the sword exercise and single-stick guards all suited to a curved sword?

The single-stick hanging guard, and the sword exercise 1st guard are well suited for a weapon which gets its most deadly result from a point, as with it you can guard a downward cut, and then being inside your enemy's guard, straighten your arm and run him through; but the only cuts which can be made direct from these guards are upwards and to the right front, neither of which cuts are wanted in mounted combat from this guard. The 2nd, 3rd, and 4th guards are all well suited for the curved sword, but instead of the 1st all native experts recommend and use naturally a guard formed by holding the sword with the point up and the hilt about opposite the right breast a little away from the body, much in the position in which Runjit Sing and the old Sikh sirdars are usually drawn sword in hand. The gymnasium instructors of single-stick, object I know to this guard, as it lays you open to hits on the elbow, and the inside of the fore-arm, which count against you in single-stick, but which are on the face of them only "flicks," and which would do the recipient no harm if delivered with a sword, as they would only hit with the flat of the blade, and which might fairly be ignored when teaching real swordsmanship. From the above suggested guard you are ready for a cut to the right or right front, and the whole of the right front of your head and body is protected. It is, however, in the sword exercise cuts that the difficulty comes in with the curved sword. Cut No. 1 is nearly impossible to do with a draw, as any one can easily see who tries it, and when done with a sword whose end and aim is drawing, it becomes a very awkward, slow, and feeble cut. Cut No. 2 is nearly as bad. The only way to do these cuts, keeping the edge leading, is to pull up the cut with a jerk as the elbow straightens, otherwise if the cut is continued as taught in the sword exercise, so as to lay on the other shoulder for another cut, the edge cannot be prevented from turning. There are similar difficulties with most of the sword exercise cuts, when tried with a curved sword with a proper hilt, notably in cut three on the right. It seems to me that as it is apparently tacitly settled that the curved sword is the best for Native cavalry, it would be best to accept the fact that a different instructional exercise is required for it to that which suits the European sword. Accept this, and the fact that in the curved sword everything must be subordinated to cutting. Realize that the drawing cut is the most effective one, as it brings most of the sharp edge into play, and "collects like the battle axe, all the momentum at the half-weak, or centre of percussion where the curve is greatest,"* and do away with the point altogether. There is no difficulty in getting a good model of a sword and hilt, as every Afridi Mallick has one for all practical purposes of as good a shape as "Futteh Jung," the famous sword taken at Hyderabad, Sind, which is said to be able to cut clean through the blade of an ordinary sword; or any of the other historical swords of India, though of course the steel is not quite so well tempered, and the jewelled hilt and the inscription from the Koran or Gulistan is wanting.

* Burton's Book of the Sword. See Major Elliott's pamphlet.

The usual inscription by the way is from the Gulistan, and might well be impressed over and over again on every cavalry soldier. It is in Persian and runs as follows:—"In the time of necessity, when no hope remains, the hand grasps the hilt of a *sharp* sword." Having got the sword, then get a scimitar exercise for it, to teach the men of the plains, who owing to the *Pax Britannica* have not the facilities for learning it at home, that the trans-Indus men have. Teach them cuts which will not give them the idea that the edge should be allowed to turn in the least, and in single-stick practice do not count any point or any cut which is obviously made with what would be the "flat," if the single-stick had been a sword. Teach them separately the knack of drawing by making them do the old Indian practice of cutting at a pillar of wet clay. This will teach them the manual knack of the draw, which they are never taught now. (The cut as now taught is very little different from the blow of an axe.) This is a cheap practice and does not injure the blades. There used to be many other things used to practise on, but swordsmen were never allowed to cut in the air. A scimitar exercise would be easy to make, and would be necessary only to teach the men to guard, to cut clear of their horses, and to steady the horses themselves. The art of cutting to be taught on foot, on definite objects, and not at the air.

Lastly, with reference to curved swords (a point which Major Elliot notices). Having once started on service with swords "so sharp that the flies were afraid to sit on them," as an old pensioned *ressaldar* of the 1st Bengal Cavalry said their swords used to be the day before a battle, never make your men, or let your men, draw swords except to clean them for inspection or to use them. When drawing swords, allow the men and encourage them to draw their weapons slowly and carefully, so as not to spoil the edge. Two or three times of "whipping them out smartly," will turn the edge, or at any rate take the extra keenness off it, which extra keenness will make all the difference whether a man disables an adversary and saves his own life or not. A curved sword should be drawn slowly (with both hands if possible), and nearly as carefully as you would take a razor out of its case.

Given a really sharp sword and a system of teaching the use of it suited to the weapon, our Native cavalry would hold their own in any *mêlée* against any troops European or Asiatic. Given a blunt compromise sword with a cutting blade and a thrusting hilt, they will be much handicapped when called on to do so.

There remains a much more difficult feature, namely, the training in peace time of horses for the *mêlée*. Some complete and comprehensive way of teaching all horses to go up to an opponent in mounted combat without shying at his weapon, and to make this training as universal as the training to trot steadily in the ranks. We all know how a good swordsman with a frightened horse is at the mercy of a 3rd-rate man whose horse will let him go in when he likes, and keep off when he likes. This, however, is a question for a riding master. Would that some one could discover a royal road to solving it.

A TACTICAL RETROSPECT OF THE YEARS 1859 TO 1890, WITH SPECIAL REFERENCE TO INFANTRY.

Translated from the German by Lieutenant B. STRACHEY 2nd (P. W. O.)
Gurkhas, Interpreter in German.

After rifled guns had been introduced everywhere in the fifties, we see in the campaign of 1859 how French infantry, armed almost entirely with smooth-bores, attacked the Austrians with large numbers of skirmishers (*Schützenschwärme*), and routed them by an impetuous rush after a short fire-action.

In some instances, however, the Austrians, being ably commanded, were also victorious. The result was that the attack in close order with the bayonet came into favour, the Prussians combining this with extended order formations, the Austrians with shock tactics.

But in Prussia the exaggerated use of such tactics soon gave way to intelligent instruction in using the rifle to the best possible advantage during the attack, to taking advantage of the formation of the ground, and to a careful application of company columns.

Owing to the peculiar formation of the ground, there was no opportunity in the Danish war of 1864 to benefit by the new tactics with the exception of the small fight at Lundby (3-7-1864), where an attack made by double the number of the defenders failed, and was followed by disaster. It was not till the campaign of 1866 that breech-loading rifles and the Prussian mode of fighting turned the scale with their full weight. Although the Prussians always adopted the offensive, they knew how to change to the defensive at the right moment, and the brave attacks of their enemies were completely foiled by the Prussian lines with frightful losses to the former. The new gun had certainly been proved to be formidable, not only for the defence, but also for the better preparation by fire in offensive movements.

The Prussian artillery did not come to the front much in 1866, as it had still a number of smooth-bore guns, its tactics were faulty, and with a few exceptions it was not employed properly.

When cavalry was used it fought exceedingly well, but its use in masses on the battle-field and in strategical reconnaissances, also with a few exceptions, was faulty.

The improvements in training and mode of fighting date in all European armies from the campaign of 1866.

The military literature which appeared after the campaign laid stress on the fact that the victories on the battle-field had not only been won by the needle-gun and the Prussian tactics, but also by the spirit of the officers and men, their training and independence on the one hand, and by their discipline on the other. But at the same time it was particularly pointed out, that the mixing of units in the fight had very

frequently occurred, and that the higher commanders had nearly always been unable to influence the fight by interfering directly. It was also pointed out, that with the exception of the company column and the skirmishing line (*Schützenschwarm*), the formations laid down in the drill regulations, especially battalion formations, often proved a failure. The chief argument was: "How is infantry armed with breech-loaders to be attacked?"

What was required was better discipline in the fight; cohesion of the fighting lines of large units; a real war-training of the soldier, and (to obtain this) abolition of many formations laid down in the drill regulations and introduction of new formations suited to the times.

That a good many adherents of the old system opposed the new measures now suggested goes without saying, and this will always be the case. Tradition and custom always fully influence the majority of mankind.

Thus it happened that no real improvement in the training and mode of fighting of the infantry from 1866 to 1870 could be recorded. Although the useless battalion formations were not used in manœuvres for the fighting line, they were often practised on the parade ground. But yet thoughtful officers and the instructions which were at that time issued to the higher leaders shewed general appreciation of the importance of the skirmishing line (*Schützenschwarm*).

For the use of artillery practical maxims were very soon recognized. Separation of guns was to be avoided, and massing of guns and an early use of them in the fight to be resorted to.

But also about cavalry new ideas had been formed, which were destined to be found to be thoroughly sound in the next war.

It was resolved to form independent cavalry divisions in addition to divisional cavalry. A happy medium was thus decided on between the formation of cavalry corps and an extensive allotment of cavalry to large units of infantry. A further preparation of cavalry for war by training and new formations did not take place; but the maxim was accepted, that the cavalry should be as much as possible in advance of the army for purposes of strategical reconnaissance.

The chief points of the mode of fighting in the French war were:—

(1) Commencing the battle with massed artillery fire, whereas the French artillery with material out of the date was much scattered and was generally beaten.

(2) The German infantry, fighting against a superior weapon, approached close to the enemy after much firing and extending.

(3) During the fight the closed masses in the first line could not form into any sort of order or hold their own.

(4) The battles were generally won by surrounding and outflanking the enemy with large or small numbers of troops. (See battles of Wörth, Spicheren, Gravelotte—St. Privat, and Sedan especially.)

(5) The cavalry influenced the fight only in very few instances.

To turn to the details of the infantry fighting, we mention that the firing line approached the enemy in extended order only. The Germans opened fire at short ranges, the French at long ranges.

Inquiring into the effect of the French fire, we must still affirm very decidedly that the long range fire of the French never prevented the Germans from advancing, as it never caused terrible losses. But a regular storm of opposition will be raised against this statement. Still the statement is a true one, generally speaking. Of course there are exceptions, but these exceptions have pushed themselves to the front. This was caused by the astonishment of the Germans at being hit at all at 1,000 metres from the enemy, secondly by a few large decisive attacks being carried out over a country specially favourable to the enemy's long range fire, and thirdly by the attack of a portion of the Guards against St Privat being performed in an unpractical manner and without sufficient artillery support. For the rest,—when was the advance stopped? At 400 yards from the enemy. At a distance which can be called a short distance, even for the Chassepôt.

This attack of the Guards is an incident of war which was always quoted to prove the fearful effect of long range fire.

In opposition to the many statements which have lately appeared to the effect that already in 1870-71 battles were generally fought at long ranges, I do not hesitate to quote many cases in which the battles were fought with great obstinacy at very short ranges, and in which neither party suffered entire destruction.

The case of St. Privat was taken as the basis of a number of proposals and trials, of which some only referred to the purely formal side of the question.

It is nothing less than a mistake (which has always frequently occurred), that the experiences of any battle are to be looked upon as general; and a lesson is sought to be learnt from them, whilst only the average of the experiences should be considered. The occurrences of war are so various, that judging by one-sided experiences should be avoided.

A further characteristic of the infantry tactics of 1870-71 was the almost total disappearance of volleys. Only independent firing by extended lines was used, although a few cases where success was achieved by volleys are recorded.

In the second part of the war we see the German infantry avoiding their mistakes without allowing the spirit of their attacks to be affected.

To advance by alternate rushes was also the result of battle-experience. It was the outcome of a desire to approach the enemy quickly. Mutual support by fire, as is now systematically practised at drill, was only then known in the field, when the ground and the position of the firing line were visibly favourable to this manœuvre.

These were generally the characteristics of the fighting in 1870-71.

Writers in all armies, at the head of which was the German army, being the most experienced and victorious, displayed great activity in seeking to draw inferences from the great experiences, and in laying down rules for the future.

The alterations published by authority concerning the cavalry were at first almost entirely on the lines suggested by the military literature of the day. In addition to improvements in the simple formations and in minor tactics, as well as in the training of man and horse, the use of

cavalry in front of an army for purposes of strategical reconnaissances was at once laid down as a hard and fast rule, and for this purpose divisions of three brigades of two regiments each were formed. The use of such bodies of cavalry in the fight was also declared possible. Some partisans of this particular point, however, went too far in their statements. But the use of three lines in the fight often practised at manœuvres, especially the part the second line played, was somewhat unnatural, and was even then looked upon by many tacticians as faulty and not in the spirit of Frederick's instructions. This opinion is embodied in the drill regulations of 1886. Returning to simplicity, the use of a strong first line is advocated.

The German cavalry underwent a change during the years 1871 to 1890, and appears to be now equal to all demands as regards reconnaissance, and cavalry as well as infantry fighting.

At manœuvres it seems desirable that the reconnaissance duties should not be carried out without reference to the probable fire-effect and cavalry screen of the enemy. Do not let us deceive ourselves, we shall not receive reports in the field like the very exact reports we are now receiving daily at manœuvres.

The artillery began with the introduction of a new field gun, which is still in use in an improved state. In connection with the above, case shot, then the ring shell, and lastly the improved shrapnel shell were introduced. Doubts raised by non-artillery men as to whether shrapnel would be effective against entrenchments were at first rather strongly refuted, but were afterwards admitted to be correct. The fact remains that the Russian army possesses complete regiments armed with field-howitzers, and that light howitzers are being constructed for use in the field in most armies.

In tactics and training the drill regulations of 1876 and 1889 contained many improvements as regards simplicity, celerity, and easiness of movements. Maxims for fire-control and for mass-firing, generally arrived at by considering the actions of 1870-71, were laid down.

The development of infantry tactics did not progress so favourably and quickly as that of cavalry and artillery tactics. This is to a certain extent natural, for the nature of the cavalry and artillery fight is much simpler than that of the infantry. From no one, in accordance with the demands of the present age, is so much expected as from the subordinate leaders of infantry, as also from the infantry soldier in the ranks. The impressions of the fight, which last for hours and are only interrupted by a few advances and retirements with heavy losses, are ever changing, and affect greatly clearness of the mind and the other qualities necessary for the fight. The control of large numbers during the fight and of the above-mentioned impressions is one of the most difficult questions, and a satisfactory solution of it has not yet been arrived at. The soldier has to observe the necessary rules of fire-discipline, often to act independently; to take such advantage of the ground, that he not only gets cover for himself, but is able to use his rifle to the best advantage to himself; work a complicated machine like the rifle, to direct it towards the enemy with the sights adjusted for the correct distances,

and to take aim; and lastly, if he runs short of ammunition or a "final rush" takes place, he has to fight with the bayonet. The education and training of a good infantry man is therefore a task, which has become more and more difficult as the modern mode of fighting has developed itself. The infantry soldier requires most the hardening of all moral qualities. The dangers of the fight which surround him are the greatest, and the hardships of war he has to undergo when marching are very considerable.

The more this is realized, the more the regulations must lighten the task of the officers and non-commissioned officers. Everything unwarlike must be done away with. Unhappily the truth of this was not realized to its full extent sufficiently quickly. In spite of many good suggestions it was not agreed upon in which direction reform should take place. Various doubts were also expressed as to whether discipline and security would not be impaired by too great changes, and further, considering the progress that was being made in the art of constructing rifles, as to whether the time for radical changes had arrived. The opinion held of the excellent drill regulations which were in force during three successful wars, was also such a high one, that the idea of their abolition was distinctly unpopular. The drill regulations had been formerly excellent enough, but now there was danger, by waiting too long, of other powers getting ahead in this matter. And so it happened. The first attempts at reform were with regard to formations. New formations were introduced on trial, which were to diminish the effect of the enemy's fire. Many of them were so unpractical, that they were given up again after a few trials. As the requirements of the day were not met several evils arose. Endowed with a spirit of independence and able to exercise their authority as in no other army, many commanders began to reform on their own account. This did not matter as long as the rules laid down in the drill regulations were not violated, but it became a malpractice when exercises were carried out in other formations than those laid down, when important parts of drill regulations were ignored, and certain exercises arbitrarily discontinued.

The shortcomings of our training at that time were partly counter-balanced by first-rate rules for the execution of field manoeuvres, by instructions of rare excellence for the higher commanders, and by the great care that was taken with regard to the training for the fight and field manoeuvres. After the infantry had been armed, first with the needle-gun, and then with the Mauser, several musketry regulations were issued in succession. The maxims laid down in these regulations were often changed, particularly with regard to training in the so-called "school shooting." This could not exactly have a favourable influence, but on the other hand this period brought with it continued improvements in positions and in the mode of carrying out field firing. In this period the "science" of shooting was also started.

But at the same time instructions for the fight were issued. In our opinion these should be omitted in all musketry regulations, their place being in the drill regulations. In the above instructions the control of fire in the attack by using volleys, and by naming the number

of rounds to be fired at a time, and by using long range mass fire with a view to take advantage of the improved rifle was widely recommended in a manner hitherto rejected. These instructions were carried out by the infantry with great exaggeration. In many places volleys only were heard, and shooting up to 1,500 metres was seen. This mode of procedure was at once denounced in the literature of the day, but was nevertheless violently opposed. But the reaction came (proving the sound spirit of the infantry), mostly from its own ranks, and at last steps were taken officially to abolish these exaggerations. The dangers of this long range fire, which we shall refer to again, had been rightly recognized.

This endeavour to make the most of a newly introduced and improved fire-arm is only natural, but it is always experienced—at this moment again—that the *technique* overlooks the conditions of the fight, and seeks to influence tactics (which are again influenced by many other factors) in an exaggerated manner.

Thus at the beginning of the last decade the infantry had arrived at the conclusion, also embodied in the present regulations, that the ranges accepted as effective for the decision of the fight should be increased, but in the attack long range fire (700—1,200 metres) was to be avoided as much as possible. Thus the German infantry was quite ready for war, in spite of the absence of new drill regulations which were up to date; but it could not be denied that the issue of new instructions should be delayed no longer. All other armies had drill regulations which paid more attention to the modern fight than ours did. After new and excellent instructions for “duties in the field,” and new musketry regulations had been issued in 1887, new drill regulations appeared on the 1st September 1888.

This was the more necessary, as a magazine rifle had been introduced in 1887 with astonishing rapidity.

The maxims published by The Great Emperor in orders at different times and often written about in the literature of the day were wholly embodied in the new drill regulations. This book lays down that the principle mode of fighting is with lines of skirmishers (*Schützenschwärme*), and that war training should be carried out by a systematic schooling of everyone down to each individual soldier in the ranks. The discipline hitherto so well observed should under no circumstances whatever be relaxed.

When the new drill regulations had been issued, many people were of the opinion that discussions about infantry tactics should be discontinued, for everything had been now obtained. But no human work is perfect, least of all can a drill book be so, the contents of which are applied by thousands of men daily in war and peace. Every order must first prove itself to be good, and therefore in the year 1890 the troops were ordered to report on the drill regulations. Of course the new drill regulations had been well prepared by mental work of seventeen years, and seldom had they been so unanimously approved of by the army.

We do not propose to discuss here, whether practical work has shewn that the alterations of certain paragraphs of the drill regulations

is desirable, but shall only refer to this subject as far as it is absolutely inseparable from the discussion which we propose to undertake about the effect of the newest technical war materials on the fight.

Soon after the issue of the new drill regulations a fresh alteration was nearly completed. For some years back small-bore magazine rifles had been constructed, and tested with smokeless powders. France led the way, and Austria and Germany were bound to follow at once. The small bore and stronger powder than the old kind produce a still flatter trajectory, send the bullet farther, cause greater penetration, and increase the probability of hitting. The small size of the narrow cartridge enables the soldier to carry more rounds on his person.

There is no question about the superiority of this rifle over the large-bore magazine rifles, or over the best single-loaders, just as the Prussian needle-gun was superior to the smooth-bore muzzle-loader. But an army which is quite prepared for war must not be behind the times with regard to its fire-arms. The mistake made by our opponents before 1866, in not arming themselves as well as we were armed, will hardly be repeated. But the spirit of invention cannot be ordered to stop working in an age when new ideas are turned into realities in a short space of time formerly unthought of. We must therefore be prepared not to expect any ending to alterations of fire-arms.

The warning not to create changes in tactics in precipitate haste, and not to desire to follow up every invention and the results obtained therewith, which are after all only the outcome of trials in peace time, is therefore very opportune here.

Already before the introduction of the small-bore magazine rifle, special explosives had been introduced for siege and garrison artillery. The penetration and effect of the new projectiles was so great, that in many cases it was necessary to make additions and alterations to fortresses, and the opinion that modern forts had to a great extent lost their value was again expressed. General Brialmont has lately opposed this opinion, and to a certain extent with good reason.

Not long after fresh improvements in field artillery material took place.

The results obtained by artillery on the practice grounds were hereby very considerably heightened, and a better percentage of hits in time of war will also be obtained. As the effect of new infantry fire-arms was always at first overestimated, so it was with the new artillery material. The estimated effect of artillery has often been exaggerated at manœuvres during the last ten years. Of course we shall at once be asked to prove that matters have really been exaggerated. We cannot, it is true, prove our assertion mathematically, as little as we can prove that results obtained on the practice grounds will be approximately the same in time of war, but we support our opinion by military history. Military history proves that new inventions have often very strongly influenced the result of a campaign, for instance the iron ramrods at Mollwitz and the needle-gun in 1866. But where is technical superiority to be found now? Nowhere! Equal material and equal tactics stand opposite each other. Better leading and numbers will therefore

decide the artillery fight. It is asserted that no infantry in the world can again advance against artillery which is firing. We would believe this, if the infantry were alone, but luckily it is not. My simple argument to prove the correctness of my assertion about exaggerations is one often employed, namely, that the enemy fires in return. "Certainly, a truth not to be denied," will be the answer from the other side; but still it is a truth, which is forgotten again and again in the one-sided judging of the effect of fire-arms on the practice grounds.

The lines of artillery of both sides will fight each other, and it cannot be otherwise. They will suffer far greater losses in men and material than formerly, and if they do their duty they will put each other out of action, and thus they will not be able to inflict anything like such losses on the infantry as is now often supposed. In the same way the full artillery power of the attacking party will not be able to act against the infantry of the defence. This is the situation which the artillery fight will bring about in most cases. If one side has succeeded in overcoming the other by better leading and superiority of numbers, then the advantages of the material will be able to develop themselves fully, as in 1870 the German artillery did against the other French arms. The incidents of war are manifold, and such cases will always occur.

The formation of the ground and the mobility of the marks aimed at must also be considered. If it cannot be denied that the effect of artillery can force infantry to adopt formations which are certainly not comfortable at longer distances than formerly, it does not follow that good infantry cannot in a suitable formation traverse ground exposed to artillery fire.

Artillery cannot follow an advance by rushes in a real fight so quickly as to have the annihilating effect which is now-a-days seen on the practice grounds.

Smokeless powder will be favourable to controlling and directing one's own artillery fire, as no smoke will hang in front of one's lines. It will, however, be disadvantageous for taking a quick aim, for a well-covered position of the enemy's artillery will be difficult to make out and the distances hard to judge. On the other hand, the capability of defence by artillery against attacking infantry and cavalry has gained, for a sudden appearance of the enemy out of the smoke is now impossible.

As entrenchments and taking advantage of cover of all sorts will play a great part in future wars, we consider the introduction of mortars to be a necessity and adapted to procure us an advantage.

The rôle of the cavalry with regard to reconnaissance, as well as on the field of battle, will become more difficult through the use of smokeless powder. There can be no doubt about this.

Fighting against the enemy's cavalry, sacrificing themselves in a dangerous crisis, sudden appearance of small bodies to obtain success in the midst of the battle, and the use of large bodies to follow the retreating enemy, will also in future always remain their tasks. To keep back cavalry at long distances out of reach of the enemy's fire will be more necessary than formerly, therefore it is absolutely necessary to accustom horses to gallop, so as to be able to operate at the right moment.

To return to own chief subject, the infantry.

The new drill regulations also give a few directions how the imagination of the soldier is to be worked upon, by laying down a few simple maxims for the fight, which are to be impressed on the soldier without fail, and which are adapted to improve his understanding and feeling of honour. It is true that all writings and books of instruction preach that the moral element and the warlike spirit must be strengthened, as they are such absolutely necessary means to obtain a victory in an age when all technical and tactical means are equal, but nobody preaches how this is to be done. It is not however possible to make rules about this applicable to all cases, but a few general maxims should be recognized in the army. These should be for instance as follows:—(1) If a position is being stormed, the attack must be carried home without halting or hesitating. (2) Loyal feelings should be awakened in the men when they are being instructed. (3) All superiors should set a faultless example by their behaviour, and treat the men honourably in every respect.

If this is done, as far as is possible, with the most zealous attention to duty, then everything has been done that can be done to develop the warlike spirit of the soldier, and to prepare him for the great and awful spectacle of war.

The physical training of the soldier and his instruction must be carried out with reference to that which our drill regulations emphasize as "warlike." The soldier must be so educated, that he will not even in the confusion of a battle forget his habits of taking aim and keeping to his officers and comrades. This in no way excludes the training of his understanding and resoluteness, but most men do not think much, when the bullets begin to fly about; some men do not think at all, for the sense of self-preservation is all-powerful in man.

The soldier must do his work with death staring him in the face. This is what he is primarily meant for, and this side of the question is so often forgotten by those who think mostly of quick training. But we also, the masters of the people in arms, often lose sight of this particular point during long years of peace. Continual technical alterations and being employed with tactical training often allow the working on the imagination of the soldier, so strongly advocated by the reforms of our army system after the defeat of 1806, to be kept in the background.

In the training of closed bodies the old rigour and exactness must be kept up. Perfection herein is brought about, to a certain extent, by outward discipline, commonly called drill-discipline. This drill-discipline melted like wax in the great battles of modern times. Fighting-discipline requires the transfer of the severe discipline to the fight in extended order, and the development of the qualities we have already mentioned. But it does not follow that rigour and exactness at close order drill now become worthless. Certainly not! They form the commencement of that fighting-discipline, and will do us, as formerly, excellent service. Those valuable qualities of the Prussian army, and now of the German army, must never be given up. If they have really been allowed to slacken off, in some cases where paragraphs of the drill regulations have been misread, as is sometimes asserted, this should be altered at once.

The opinion has also been published that it is incompatible with the spirit of a good training for the fight to take notice of such things as direction, dressing, etc. These should be reserved for the parade ground, and only that should be asked for which is applicable to the fight. The writer of this believes he very long ago strongly advocated the true fighting-discipline and the true order of battle, which of course in the fight of extended lines—almost the only formation for the fight—can take no heed of direction and dressing.

But the advance of closed bodies under fire, the attack at night, and the forming up under the enemy's fire after a successful attack, are also operations of the fight. Now here, even when advancing on a plain, the observance of regularity, of the most perfect order, as can only be expected on the parade ground, is very advisable—we may say necessary. The voice of the commander will not be sufficient without the custom of the men to fall in noiselessly, to stand steady, and dress quickly. No, do not let us drop this ; let us always demand here, what is at all possible, as it is compatible with the spirit of the modern fight, and on those occasions when rigour and keeping together are really essential to fighting.

The drill regulations say we should learn nothing we cannot really apply in the fight. But the fight demands rigour and exactness, and we are of opinion that we cannot do without them. *He who is slack at drill will certainly be slack when fighting in earnest.* It would not be difficult to quote examples from the last wars, when an appeal to the custom of most punctilious order did wonders. War has many different aspects, and there are moments when the custom of the most painful exactness saves us from reverses ;—it is true, only then, if we know how to take advantage of this custom.

For the rest, we advocate the simplest forms, but these must be rigorously upheld. The best drill regulations cannot be a success, if they are not observed in the spirit ; if that which is undesirable is not put aside altogether ; and if that which is worth maintaining is not kept up scrupulously.

No energy is required to practise new formations, but if we should carry out the training of the soldier and of bodies for the fight, in the systematic and laborious way which the drill regulations demand, is another question. To carry out these instructions in our climate, especially in the east, calls for unusual vigour and resolution. But if we do not carry out the training in this manner, we derive only half the advantage we might otherwise get.

To train a body of troops, it is necessary to show the men cases such as might occur in war ; therefore the mixing up of large bodies of troops, as an exercise in time of peace, is an absolute necessity. If order is then still maintained, a great step has been taken in the right direction.

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SECTION—COLUMNS

from

PARADE TO BATTLE.

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INTRODUCTION.

The companies of a battalion formed for attack may be arranged according to two established systems known to military students by the untranslatable German terms of *Treffenweise* and *Flügelweise*. In the former method the entire companies are placed one behind the other, in the second side by side.

The former method has been usual till now. The accepted formation for the first line of a battalion for instance is composed of two companies in the firing line (with supports) and two in the reserve. It follows that by the time the reserves have been absorbed in the firing line, it consists of four mixed up companies. This happens probably before the effective (500 yards) or attack distance is reached. By using the other method this defect is obviated, for the companies have each their own special and inalienable Battle Front, and are fed by their own organization and numbers until exhausted. A fresh company then takes up the same battle front and continues to hold it till it too is exhausted, when it is then once more replaced by another company, and so on until the "assault." There is no mingling of *organized units*.

The individual *remnants* of a former company, if not too exhausted and if still possessing ammunition, will yet form part of the sections of the new companies. If unable to do so, they will rally when the 2nd or 3rd line comes up.

Men and commanders of each company thus work together and remain to the end unmixed. (Fig. 2 Plate I.)

Under the present system the commands spread lengthways. A Captain has to superintend from 150 to 200 or more yards of Firing Line. A hedge, a brook, may interfere with a good command when not under fire, as effectively as noise or tumult does when firing has once commenced. When all the reinforcements of the first line have been brought into the firing line there are then present two company commanders, with a double set of section commanders, and men thoroughly mixed up. (Figure 1 Plate I.)

Orders from the rear have to reach the Firing Line by special messenger (danger) or bugle (noise). The Battalion Commander feels that a company "sent out" is gone for good or bad beyond his control. Such a command is an impossibility.

In the Section-Column Formation this serious defect also is obviated.

A perfect system exists whereby to pass orders from rear to front, and convey intelligence from front to rear.

The Battalion Commander holds the Firing Line *in his hand* from well in rear even of the second line, and can control it as certainly as he can control the points of his comb held at the back. Commands by word of mouth can thus be given without shouting, and without any running or galloping.

In the present system another defect is apparent in the case of a sudden flank attack. The threatened flank, possessing two (company) commanders, is liable to become confused as to the proper formation to be taken up to resist the flank attack.

With Section-Columns a flank attack is met by *one* commander, and *one* company in extended sections or closed groups, with gaps through which the neighbouring company sections can come up to assist in repelling the attack, and then quickly resume their places.

At present the companies often move "en bloc", affording a conspicuous target to the enemy's artillery. In the Section-Column Formation, the small groups being scattered all over the field, offer no conspicuous target, yet are nevertheless under systematic and perfect control.

This proposed system permits of a change of front without confusion, it permits of the engaged troops being kept so under control from the rear, that they may be employed merely to harass the enemy, and to await further events. The whole Firing Line, or only part of it can be withdrawn. The whole can be pushed forward, or only a part. A serious attack can

be entered upon forthwith without further arranging.

The same formation applies to the open plain, or jungle, or broken ground.—

The Section-Column Formation is also most suitable for route marching, and advanced guards; and is also well adaptable to closer formation still. It affords then *one* formation from the parade ground to the enemy's position!

The spirit of the new drill book, establishing as it does the principle that a "Commanding Officer" has the necessary freedom to adopt any system he likes within "general ruling principles," this Section-Column system may be adopted by all who fancy it. This freedom of action is what Commanding Officers should strive to make the most of. Even if a system may have defects (not radical), its adoption, and performance with "faith" and consequent "go" will give better results than the half-hearted performance of a distasteful one. The following paper is published with a view of letting my brother C. O.'s consider and try a system, which in many ways seems to me preferable to any other system that has as yet come to my notice. Some lesser details are omitted. These are best left to be drawn up regimentally.

PART I.

BATTLE FORMATIONS.

Remarks.

The guiding principles are:—

1. The General Battle Front is subdivided into Company Battle Fronts of fixed dimensions.
2. Such (C. B.) Fronts are worked by organic units in succession (companies, wings, battalions).
3. The "Engage" and the "Attack" (with assault) are distinct phases of a battle.
4. All reinforcements are made direct from rear to front.

The company must be formed up in accordance with the new drill book (92-98).

It is divided into "sections," organically and tactically as much as possible the same. They may be four, three, or two, or even one in number. The best strength for a section is from 8 to 12 files. Every section must be divided into a right and left "fire unit." Each "fire unit" must have two to three "commanders" told off.

If a company has only about 20 to 24 files, it is best to work its *four* organic sections as "fire units." See Figure h, Plate V. Another weak company will make up the 3rd and 4th (or more) reinforcing sections.

If a company has only about 10 to 12 files, it is attached as a "section" (perhaps a fifth) to another company.

If a system of, "double companies" is introduced, the two halves are best kept separate, one in the first line, the other in the second.—

In the Native army British officers should *only* superintend.

They are too valuable to have their influence restricted by being given a definite executive command. Such are best exercised by native officers and non-commissioned officers, assisted by an occasional "instruction."

In rare cases a "lead" may be desirable, but interference with the commands is most reprehensible.

A company is hereafter assumed as being composed of about 40 files.

The Company.

The Battle Formation of the company is a "Section-Column" expanded to a Front of 50 yards, and to a depth according to requirements, but not to exceed 400 yards. This forms the "Company Battle Area."—

The *length* of the "Company Battle Front" is *fixed* at 50 yards, and is composed of a Firing Line of 40 yards, with 5 yards on either flank as intervals (Fig 3, Plate I.)

The *density* of the firing line *varies*. It may be a line formed by a few men only as scouts (by extending for instance the front rank of the leading section) to a dense "firing line" of two or more men per pace, according as to whether the company is taking part in an "Engagement", an "Attack", or an "Assault." Whatever the density of the firing line, it is always divided into right and left "Fire units."

The Captain is responsible for its being of a density appropriate to the work in hand.

The distances between the sections are also regulated by the Captain, in relation to the casualties, and to the ground. For the first and second "zones" when under fire, the distances noted below would on open ground be appropriate (Figure 3).

Leading Section, 20 men 2 yards apart.

Second section, (20 men 2 yards apart) following at 150 yds.

Third section, do. do. do. following at 150 "

Fourth section, do. do. do. following at 150 "

Connecting files every 50 yards for passing words of command and intelligence. These join the Firing Line with their own units. Fresh connecting files are immediately sent forward.

Whenever the ground passed over at any time makes it possible (undulations, wood, etc.), these distances must be considerably reduced. Say to 30 or 50 yards between sections. Expansion is only a method of protection against the enemy's bullets, otherwise it is a source of weakness.

A company thus formed up supplies its *own* "supports" and its *own* "reserves" for its *own* "firing line" under its *own* staff of commanders in its *own* ground.

Each company has thus a portion of the battle-field allotted to it, to work uninterruptedly till it can do no more.

As each section is divided into right and left sub-sections (units) the Firing Line remains from first to last organically divided into right and left "fire units" (see appendices I and II), which support one another by alternate volleys, especially when it is desired to advance alternately by rushes.

When the last section of the company has entered the firing line, and the Company Battle Front requires further stiffening, reinforcements will be made by a fresh company from the 2nd 3rd, or 4th "line of battle," and it will work the same Company Battle Front in the same manner as the previous company; the new captain taking command of the company "Battle Area," and the new section commanders of the "Fire Units." The previous company is to be considered organically extinguished. Those of its men still physically capable and in possession of ammunition will remain in the new "fire units," the old section commanders assisting the new ones.

The Captain is solely responsible for the dispositions of his company in the Company Battle Area. His place is anywhere within it most suited to his responsibility.

The Lieutenant (Jemadar) will be on the directing flank of the leading section, some 10 paces in rear, and superintends the direction.

The 2nd Lieutenant (Colour-Havildar) will be in a similar position behind the rear section, and sees that connection is maintained by connecting files or signal with the Wing Commander or Battalion Commander.

"Unit Commanders" move in rear of their fire units as soon as these open out. The senior commands the entire section as long as it works as a whole, but at all times volleys are given by "Units" and not by extended whole sections.

Each section commander is responsible for a regular and un-

broken connection with the section in front of him, and will send out connecting files as required.

Each section must slavishly follow the track of the one in front, however tortuous, however straight, and will strive to keep close up to the front whenever cover permits.

The intervals in the firing line will be kept from the centre of each fire unit; whose commander is responsible for the direction.

The Battalion.

The Battle Front of a Battalion is composed of two or more Company Battle Fronts.

Whenever possible the same Battalion should form the 2nd and 3rd lines of battle, if these are needed; in the same way as the company forms its own supports, and reserves, in the First Line. After entering the Attack stage, the advance must be by rushes, covered by a *heavy fire* up to 150 yards, the Firing Line being steadily reinforced by the sections in rear, whether of the original company or of those following.

A "Company Battle Front," to be carried into the enemy's position, may require to be "fed" by a dozen sections one after the other. These should belong to one and the same Wing and Battalion. These are at *first* divided into 2nd and 3rd lines, but this distinction is quite lost on approaching the position.

A Wing (four companies) would ordinarily attack with two "Company Battle Fronts," and two companies forming the 2nd and 3rd lines, as in figure 8 Plate 2.

A Battalion similarly could have four Company Battle Fronts as in Figure 4 Plate II, where the companies are shewn numbered as if placed for a serious home attack. Each Company Battle Front has thus 8 sections to feed it. (See Figure 8 Plate II).

At *least* two sections should be kept per Company Battle Front, and not be allowed into the Firing Line. If all the sections (but two) are absorbed into the Firing Line before the Attack is desired, an attack can hardly be made if the enemy is at all in force.

The companies of each wing should be kept behind each other.

The rear section commanders are responsible that the Wing Commander, or Battalion Commander is always kept touch with by dropping the necessary connecting files, and by looking out for signals.

The Battalion Commander, assisted by the mounted officers, keeps constant touch with the company officers in the Battle Area, by means of a regimental system and communication, verbal or by signal.

The several methods of employing the companies of a Battalion are shewn in Plate II.

The advance during an engagement in the open should be in a general line by the right, left, or centre, the inner fire unit commanders being responsible for the direction of the Company Battle Front, and for the intervals between them. (Figure 3). In wood, or jungle, it can be made by the sections in file (Figure 5). In broken ground (or cover) an advantageous position for any one or all the sections of a company should be secured by a rush, and retained as long as its fire is not masked.

Company Commanders should have the greatest liberty of action within their own Battle Area, the only lateral link between companies being that of *mutual fire support*. When one Company Battle Front is checked, the neighbouring C. B. F's. concentrate their fire on the obstructive object.

The fixed intervals must not be reduced, but may be extended to suit the action of the battalion as a whole. A battalion with plenty of room can make an enveloping attack by increasing the intervals between companies which converge on the objective. Figure 7 (Plate I). If a convergent attack causes over crowding in the "First Line," the C. O. must eliminate one or more companies by causing it or them to lie down; the others will soon reunite into a general line. The Company Battle Front must however on no account be extended. It is fixed at 50 yards *whatever the strength* of the company.

The Brigade.

A Brigade will engage by employing its Battalion in the manner above explained (Plate II).

Even if a brigade forms only *part* of a General Attack, it should form its own 3 or 4 lines. If the task before it is a serious one, the Battalions should be so arranged that reinforcements to the First Line, from the Second and Third and Fourth lines, should belong to the same Battalion (Figures 2 and 5).

The principle being to make all reinforcements from "rear to front" and from portions of the same organic unit*. This ensures cohesion of command and unmixed ingredients in the several Battle Fronts to the very last.

If the action is expected to be only an "Engagement" by a First Line, then all the companies of one Battalion could be placed in the 1st line (Figure 3, Plate II), with another Battalion in the 2nd and 3rd Lines in case of accidents or unlooked for after events.

* *Fig.*—Sections as minimum to the Battalion as a maximum. The Brigade is a conglomeration and has no organic vitality.

Note 1, Officers.

Company officers must always have a "guard" (one man) to assist in conveying orders, and to protect the officer engaged in supervising all parts of his command from treacherous attacks by wounded enemies, or from ambuscade. The company commander has the bugler near him also, and a signaller in mountainous country.

All British officers must also have a guard "file."

The Captain must keep the Battalion (or Wing) Commander informed of anything which he thinks his Commanding Officer may not be able to see for himself.

All communication should be in a low voice or by signal.

The Captain adopts on his own initiative any formation he thinks best suited to the circumstances. His one object is to keep his firing line up to the required strength.

At drill he regulates the "fire effect" by directing the number of casualties without which no sound practice of reinforcement is possible.

The Company Commander has complete control of the Company Battle Area, until the leading section of a reinforcing company arrives in the firing line.

His command of the Battle Front then ceases.

Company officers give no executive words of command in the Battle Area except "Follow me" at the Assault stage. All else must be given as "instructions" to the section or fire unit commanders.

Company officers cannot have a too high appreciation of the importance of the company "Battle Front". On its efficient working depends the result of battle. How to improve it by further training the individuals concerned, should be always on his mind.

When in "solid lines", section commanders must merely see the Captain's orders carried out. Volleys must be by companies, for a "company volley" is more effective than four "section volleys," on the same principle that "section volleys" are more effective than the individual firing of the men comprising it. The shouting of four men, each endeavouring to shout the other down, causes a babel of undisciplined confusion, which is obviated by the command being retained in the voice of one commander. For all "firing" the *letter* of the company must be used, for it is unalterable, whereas the battalion number is frequently changed and often disremembered.

The later drill books attempt a distinction between "Parades" and "Exercises." The newest will entirely separate them. This cannot be too strongly emphasised at inspections, though it will take some time before the distinction is fully realized by all.

Parade and Review "exercises" are for the purpose of proving the discipline of *matter*, with a subjected intelligence. Precision of movements with smartness in handling arms is the principle requirement. This is reversed in all field "exercises." Discipline of the *mind* is the chief requirement here, and any attempt to make the men retain in their minds a desire to make the hands "tell" together on the rifles will materially mar our efficiency.

On all such occasions these euphonious formalities must give way to the really important points in connection with the *true* "handling of arms". The correct adjustment of the backsight may take one man a little longer than another. Hence must be allowed independent individual action. When sights are adjusted men should look to the front, instead of looking to the right or left, or make a pause for appearance sake. For good results the men also require to get into a comfortable position before firing; if it even brings about several movements of the body. The 'present' too should only be obeyed subject to a man being able to see the object named.

By several men abstaining from coming to the "present" silent indication is given to the commander that a shift of ground is advisable. It is a sign of the men being still well in hand. The "fire" should as long as possible be given "together", yet there is no objection to ragged volleys. If the men are at all

extended it is in fact preferable; being less of a strain, it might ensure a better individual aim, and might therefore give better resultst.

Gentle motions for opening or closing the breech should be insisted on. It is less fatiguing to the men and less injurious to the weapon. Ordnance Officers can explain the harm done by rough handling; and the frequent breaking of the "block lever catch" can be traced to the "smart click" on opening the lever*.

In the field, words of command must be minimized. The following may be frequently omitted 1°....."No.....Section." Men must get to learn the voice of the commander, or learn at once to obey the command applicable to them. All men within ten yards (when not in solid line) of a command should obey it. This 20 yards (ten yards on either side) is the largest 'section command' practicable for good work. In the Section-Column attack each company firing line can have only *two* section commanders, one right, one left; this obviates all doubts as to which voice to obey. 2° "Volley firing" or "fire a volley." All firing is by volleys except "Independent," which only needs specification. 3° "Ready." In the firing line soldiers should at once reload after each discharge. The illustrious records of the British army of bygone days were wrought by men who loaded immediately after discharging the muskets, and there can be no advantage in allowing men in the battle "Front" of the present day remaining even for a single moment "un-ready." Our mechanisms are perfect and there is no more chance of the rifles going off now when loaded at the "full cock" than in former days at the half. When a lengthened advance is contemplated (of the firing line) the levers may be lowered without fear of the rounds falling out, but as a rule even this precaution is quite unnecessary.

Note 2, Reinforcing.

A fresh company "reinforces" the Firing Line, but its commander "relieves" the former commander of his "command."

The Captain of the "relieved" company on being relieved of the command of the Battle Front, will at *his own* discretion either direct the remnants of his company to proceed with the new company at once, or direct it to lie down and then reform.

It is the old Captain's first duty to assist the new Captain (whether senior or junior) to his utmost. The best way for doing this might be in first giving his men time to collect themselves under cover and to replenish pouches.

This done, he could once more join in the fight as a reorganized unit with an improvised Battle Front of his own selection wherever a suitable gap appears.

If under a hot fire in the open, and the attack is approaching the Assault stage, he would perhaps best struggle on with the fresh company, borrowing ammunition from it if possible, or if he thinks the attack is making good, he can make his men lie down, take a pull at their flasks, and munch a tablet of cocaine.*

(* *N.B.*—Three of these should be in every side pouch for extreme cases of exertion.)

The reinforcing company from the 2nd or other Lines of battle must bring up reserve ammunition to dispense to the troops engaged.

The Captain of the company will see from the appearance of the track he passes over, the strength his first line should have at the outset.

It should come up strong, and together, and open fire by regular volleys except when coming up at the assault stage, when independent firing will be at once begun. Feeding by dribblets is discouraging, whereas fresh sounding volleys encourage the attackers and demoralize the defenders.

Reinforcing, with the change of Commanders, requires practice.—As also the sub-command of right and left Fire units, which when the last section has reinforced, will probably contain men belonging to the four *sections* but all of the same company.

† With the present monosyllabic "Fire" it is difficult to present discharges on the "as you were." It is better to make two distinct syllables of the word; thus "Fire.....yah." This might be the means of frequently preventing fatal mistakes, or waste of ammunition.

* A powerful jerk with the thumb on the lever, expands the loop; this increases the length of the lever, and forces and breaks the "catch."

A rapid assumption of command and a rapid submission to new commanders are essentially matters for frequent "Drill"—

Note 3, the Attack.

The transition from the "Engage" to the "Attack" is a serious matter, which cannot be taken out of the hands of the Battalion Commander (or Senior). When definitely ordered,—e.g. "The 45th Sikhs will attack,"—the firing line will be at once made as dense as possible (if not already so) by the Captains reinforcing to one man per pace. This done, the captain will signal to the Unit Commanders to "advance", which must be steady yet quick, in as general a line as the ground permits.

Rushes must be made, over open ground by a Company Battle Front at a time, or when singly a company acts by "Units" at a time. Right leads always. Rushes not less than 40 yards.

Fire must be kept up without ceasing to "crush" the enemy. At least 3 $\frac{1}{2}$ -leys for every rush.

The firing line must be kept up to one man per pace, reinforcing sections must be close up, and doubled in (sections at a time) as soon as casualties permit.

The least danger lies in pressing on, quietly steadily, yet quickly.

On the "Attack" being ordered, the sections in rear will close up to 80 yards. No greater intervals between 2 and 3 lines. The rear sections must smartly run up as soon as they see the section in front move on.

All ranks must LIE DOWN as long as bullets are circulating, cover or no cover. Men firing only assume the best position to fire in.

Note 4, the Assault.

The company first in a Battle Front will rarely be able to "Assault." The second company may. The third must, otherwise the "Attack" has failed.

The Attack advances in as dense a line as possible (one man per pace) to within 150 yards of the position, when without further orders from the rear, Independent Firing commences, and must be kept up till the enemy's fire slackens or ammunition is within a few rounds of being expended. Whistles sounding, the position is rushed.

The firing line is the assaulting line. On reaching the position the Assault will halt and lie down, company commanders only stand and look to the Battalion Commander for signal or order. The Assaulting Line under no circumstances crosses the position without definite orders. These may be, to continue the rush forward and follow on the heels of the enemy, or to at once open fire on the retreating enemy, or to reform under cover of the fire of the sections which have not taken part in the assault.

On hearing the independent firing commence, the sections in rear (whether of the 1st, 2nd, or 3rd, or other lines) will at once close on their centres, to loose intervals in single rank, and move up at the double to 30 yards of the assaulting line, where they will lie down and wait for battalion orders. These may be to cross the position and open fire on the retreating enemy, &c. &c.

On being ordered to, the companies will reform in line of Section-Columns and replenish pouches.

Note 5, Casualties.

The Company Firing Line is fixed at 40 yards, which gives sufficient room for 40 men (viz. two sections).

This is the thickest useful density possible, and it must never be exceeded except at the Independent Firing (assault) stage.

The 3rd and 4th Sections will therefore not be able to get into the Company Battle Front unless casualties occur.

When a strong section sends forward reinforcements, it should usually do so by a 'rank' at a time and not by spreading out half-sections. This will keep the men of the right and left half-sections (units) together, each in the right and left "Fire units" of the firing line.

Casualties must always be practised.

To reinforce with the 3rd and 4th sections unless gaps are made, is bad instruction, and therefore punishable.

The "advancers" trained to seeing men on the ground and passing over them at drill will think less of the matter in war. If trained to the fact that the denser the track of casualties, the more rapid the reinforcement must be, the purposes of drill will attain the greatest results in war.

No. 6, Rallying.

The proper course to pursue after reaching the enemy's position depends so utterly on *unknown* and *unforeseen* circumstances, that to lay down any rules or distinct orders for action is professionally wrong. Principles only can be enunciated.

The defenders will either stand to be bayoneted or they will evacuate before the assaulting stage. *The earlier the evacuation the greater the necessity for caution.*

The proverbial "third line" surrounded by a swarm of 1st and 2nd line attackers reaching the position breathless, advancing, firing volleys, and "*rallying in lines*" so many paces behind each other, &c &c., will form an acceptable target to any artillery the defenders may be still possessed of. It would not take long to break up these desired "three lines".

The practical course is either for those units which come up formed to quickly pass *through* the position into unranked ground well beyond the position, and there to fire at the retreating foe; or *not* to cross the position at all till after a careful look round. No troops should cross the position without special orders.

All rallying of *remnants* should be on the attackers side of the position.

The only fixed rule that can be laid down for these is for "companies to reform under the nearest cover, lie down, and wait for battalion orders."

PART II. EXERCISE FORMATIONS.

Solid-Lines are of value for purposes of Ceremony or Savagery. As these two cases have still to be provided for, a few Solid-Line exercises must still be retained in the drill book, and practised, as heretofore. For all other purposes, however, a "Solid-Line" is an anachronism.

A Section-Column has been taken as the basis for all Battle Formations. It is equally applicable for all Exercise Formations, whether on parade, on the march, on the road, or across country.

The transition of a battalion using the Section-Column system from the parade ground to the battle front is expeditious, passing as it does through the various stages with ease and simplicity. (Plate III).

With the Section-Column the necessary manœuvres required by the "Infantry Drill" book can be readily effected. *e.g.* A Battalion on parade can be drawn up in Section-Columns at full or close intervals (Figures 2 and 3, Plate IV).

When at full intervals it marches to the front with all the advantages of the "march in fours to a flank."

It can change front rapidly when at full interval (Exercise No. 1), or when at close intervals (Exercise No. 2).

If suddenly attacked by cavalry or savages, it can form company squares (Figure 4), or it can form line to the front, or to any direction on any company.

By this system section commanders are *continually exercising control*;—a tangible advantage towards securing good discipline when in more extended formations.

Exercise No. 1, (see Fig 2, Plate IV).

A Battalion in Line of Section-Columns at full intervals changing front on a central company.

- | | | |
|---|---|---|
| Change Front
Half-right on
No. 3. | { | <p>The leading section of No. 3 at once forms half-right. Its rear sections turn half-left.</p> <p>Nos. 1 and 2 turn to the right about.</p> <p>No. 3 covers.</p> |
| Quick march | { | <p>The other leading sections form in the required direction and follow their captain's lead (or subaltern's in case of those companies moving to the rear). The other sections in each company change direction on reaching the pivot, and follow.</p> <p>On the captains finding their position in the new alignment, they "Halt", (front), "Dress", "Stand at Ease."</p> |

Exercise No. 2, (see Fig 3, Plate IV).

A Battalion in Line of Section-Columns at close interval changing front.

Change Front
to the right.
Quick march.

The Right Wing Commander at once gives "Right wheel", and halts when in the required direction.

The Left Wing Commander at once gives "Right Wheel" and "Forward". On reaching the half angle gets into alignment and wheels the remainder. "Halt," "Dress," "Stand at ease."—

Captains direct—if wanted elsewhere, the commander of the leading section takes the Captain's place.

Exercise No. 3.

Form square.
Double.

The leading section halts.

The second section forms to the *threatened* flank.

The third section to the other flank.

The fourth section closes the square

All fix bayonets as soon as in position.

PART III.

Remarks.

The following notes were intended merely for the use of the officers under my command, but being more or less connected with discussions on the attack formation they are appended.

A variety of opinions on professional matters exist which should be beyond discussion. Officers belonging to the same organic unit should always work on the same principles in the "Attack and Defence" to obtain the best results. The commanding officer's views are naturally the best to conform to.

Officers old or young have often no bounds to their courage, and their desire to carry out "orders" blindly is insatiable.

When given two companies, and directed by a "Staff Officer" to attack an equal force of the enemy in yonder Farm House, where it can be seen that he is well fortified not only behind unscalable loopholed walls, but behind 1,000 yards of open flat country, many a young officer would unhesitatingly enter upon a frontal attack without a doubt as to his brave heart carrying him and his men safely through the brick wall and all. Such heroism is only too common, but to permit this in Field Training is criminal. The serious aspect underlying all such field exercises with their solemn issues when practically applied are too often forgotten.

In the sister service an officer, who by an error of judgement at 'exercise' bumps his ship, is arraigned before a tribunal of enquiry. If at 'exercise' in the field a battalion is bumped against another holding a strong position, the crime is usually condoned by a few words at the end of the day's "proceedings".

Field exercises are no longer "sham fights," but should be downright honest rehearsals, with means for giving the needed correction to bad training or faulty knowledge. Commanders making glaring errors would find it most instructive to have to defend their action by argument before a selected "board", of which the general officer commanding is president. It might also lead to unmerited blame being explained and removed. Half-an-hour of such an ordeal would do more good than years of ordinary "camps of instruction," with uncorrected and smiled at errors.

It can not be too strongly impressed upon officers in the present day, when owing to extended formations the youngest has a command in the Battle Area, that all orders from above are hedged by the formula (having Napoleon's seal in remarkably emphatic language) that, "the implicit execution of a military order is dependent on the supposition that it is given with full knowledge of facts

and conditions, at the time the order is *to be given effect to*." "Un ordre militaire même n'exige une obéissance passive que lorsqu'il est donné par un supérieur qui, se trouvant présent au moment où il le donne, a connaissance de l'état des choses, peut écouter les objections et donner les explications à celui qui est chargé d'exécuter l'ordre." (Nap. 1796-97). Many things may happen between the time of giving an order and the moment when it can be carried out.

In the case just mentioned the General, knowing that a Brigade was on his extreme right, said to his Aide, "Go to the officer commanding the extreme right, and say I wish him to turn the enemy out of that Farm."

The juvenile A. D. C., passing the Brigadier, with a waive of his cigarette gallops off to where he sees two companies on the "extreme right", sent there as a precaution by the Brigadier, and delivers the message.

The young and inexperienced officer in command without a moment's hesitation advances his men and attacks. Of course neither he nor any one of his men get to within 300 yards of the Farm.

A somewhat older officer perhaps with diffidence tries to point out that he has only two companies &c. But the staff officer, with a reply *à la Nolan*, causes the infantry officer to flush up and advance. He also leads his men gallantly but foolishly to certain destruction.

Another stamp of officer would have asked the staff officer, if the General knew that he had only two companies, that the enemy was equal in strength, well defended, and at the other end of 1,000 yards of open plain, etc etc. Any flippant replies would have been summarily checked, and the staff officer told to "report the facts as *they now are*, to the General Officer Commanding." This officer had received a proper training, had a true appreciation of the responsibility of his "command," and had the courage of his own opinion. Officers should be *trained* to act and think for themselves, and not merely to obey "orders" which are often merely of a conditional nature.

NOTES.

1. *On offensive operations*.—Offensive operations directed on the "Front" of an enemy's position do not necessarily end in the "Attack." After artillery preliminaries it is usual first for an "Engagement" to take place all along the line at close rifle distance (as near 500 yards as possible). The "Attack" would be made only at those points found to be most vulnerable. Only a portion of the troops "Engaged" take part in the "Attack."

The "Attack" similarly does not necessarily end in an "Assault."

The Defenders, having developed weak points and seeing them "attacked," will frequently refuse and retire without crossing bayonets. On the other hand "Attacks" often fail and end without the "Assault."

Thus in "offensive operations" by infantry against an enemy on the defensive we see three distinct stages, the "Engage", "The Attack", The Assault." These stages have only a partial relation to "zones" and cannot be definitely described by distances.

[N. B.—The term "zone", having direct relation to "range", necessarily implies unimpaired vision, without which range is of little value. It is to be expected that the infantry "engage" will only commence when the defenders have been robbed of the advantage of range either by the accident of ground, darkness, fog, or demoralization, due to a good "Preparation."]]

The "Engage" by infantry may, if the ground is unfavourable for an advance under fire, commence at "long volley" ranges by a few selected units. If the ground is favourable to an unseen advance, the "engagement" stages may be fireless, and the distance (in jungle for instance) reduced to a few yards.

According to circumstances it may therefore range between 3,000 yards, the first point at which troops come under fire, to about 150 to 200 yards for reasons given below. All fire between 800 and 500 yards belongs to the "Engage" stage.

The "Attack", if unfavourable, begins at 500 yards, the first telling range for our best rifles.

It may commence at 200 yards if favoured by ground, fog, darkness, surprise, and so forth.

The "Assault" ranges from about 200 yards (the running limit of heavily equipped and fatigued men) to within 10 or 20 yards of the position, from which point the position would be "rushed" even in fog, darkness, or surprise.

The "Attack" stage cannot be entered upon by the Captain without special orders from the Battalion Commander (or the commander of the 2nd or 3rd lines of battle), because the success of the attack depends upon the amount of troops available *in rear* of the first line. These are troops over which the Captain has no control, and concerning which he has no knowledge.

Once the "Attack" has been started authoritatively, it must be driven home. Unauthorised "attacks" are frequently the outcome of egotism and indiscipline, often ending in failure. There may be exceptional cases when they are justified, but the decision (involving punishment or honour) must be established before a Court Martial. Self-seeking must not be allowed to endanger the whole.

2.—*On Natural Formations.*—Armed individuals (ill disciplined), bent on attacking a foe in position, if determined, will naturally make straight for a position facing the enemy's, at a distance from which they instinctively feel that their fire will have effect.

A rapid advance into this attacking "Fire Line" will be the only consideration. Losses before getting there will be accepted. A line 2 to 3 deep is thus formed as quickly as possible, a few hundred yards in front of the defender's position. A hot fire is poured in, which obliging the defenders to duck or to reinforce, makes a pause in their fire during which the attackers run up nearer. If necessary another line is formed, and the process is repeated. In due time the Assault is made.

This is the *natural* procedure of armed individuals. The American war teams with illustrations.

A pattern "natural attack" would be this:—acres of ground covered with single men, each making straight for the line of "attack." (Contravallation).

The best "sealed pattern" attack for an army is that which approaches most to the laws of nature. It is always costly to oppose natural laws. The "Section-Column" system is the nearest approach to nature, giving controlled dispersion during the advance, and the simplest and shortest method of feeding the "Fire Line" to the Assault.

3. *On the Numerical Strength.*—The number of men required for offensive operations against an enemy varies according to whether the operation is an "Engagement", an "Attack", or an "Assault"

For an "Engagement" few men with a bold front may suffice to "contain" the defenders in their position.

The smallest number would be that which would suffice to repulse a frontal counter-attack, the largest that which would be deemed necessary to turn the engagement into a serious Attack or assault. A minimum of $\frac{1}{4}$ to $\frac{1}{3}$ th of the strength of the Defenders and a maximum of 10 times their strength offer a large margin for the exercise of professional judgement.

It is only by a correct grasp of the situation that the best dispositions can be made. Battles have of course been won in spite of the worst dispositions, but generally at an extravagant cost of fighting material.

For an "Attack" the relative numbers are more defined. If the defenders are in a good position, that is—if well entrenched, secure from any but a frontal attack, with unlimited ammunition, and with sufficient supports to keep up one man per yard of line defended, the recognised proportion necessary for a successful frontal attack is

from 6 to 10 (or even more) times the number of the Defenders. Because these are able to fire about 6 to 10 times the number of rounds to each one fired by the attackers during the advance (in motion), and with 100 % greater accuracy and effect, due to known ranges.

For a Frontal "Attack" of that nature therefore, a hundred yards of defence requires from 600 to 1,000 attackers. This disproportion becomes less as the defenders are reduced in numbers by artillery (or long range volley) fire.

The relative quality of the troops also materially affects the relative numerical proportion, and this factor may even allow of the ordinary proportions being reversed.

But it is wisest to consider our battle formations with reference to the strongest foe we may have to meet. To modify them to suit minor requirements is easy enough. For ordinary considerations then (Drill Manœuvres, camps of exercise in times of peace, and good troops in time of war) it must be clearly understood that to make a frontal attack against 100 yards of defenders with less than a battalion in war is criminal, and in peace bad training.

It is seldom that offensive operations cannot take an "Enveloping" form. It is only by this means that the attackers (infantry) can crush the defenders (infantry) with bullets (p. 87, line 7, New I.D.). When the offensive operations take an enveloping form, a proportion of 4 or 5 to 6 is sufficient for a good first line. For though the Defenders have still the advantage of rapidity of fire, accurate ranges, partial invulnerability, and unlimited ammunition, still this is counter balanced by the more scattered target, the effect of a concentric fire, and the uncertainty of events due to strategic actions or the partial threat on the flanks. The latter a most important consideration.

A general "enveloping" attack will seldom end in a serious assault. The position will be given up before the final stage. The "wavering moment" must be quickly recognised by the assailants, when a "Straggling Assault" will be sufficient.

Another reason for reducing the full proportion (to 5 to 1) is that a defensive position is seldom held uniformly and actually one man per yard. Portions only of a defensive position will be so held; the spaces between will be either made impassable by obstacles under cross fire, or held by dispersed groups of men. An "Engagement" as along the front would have for its object the discovery of points where, a "local enveloping" could take place. The "Engage" in front of such points is then turned into a serious "Attack." The locally enveloping attacking lines must be protected from cross or reverse

fire by the general line on either flank pressing well up and keeping the defenders of the supporting points of the point attacked, fully "engaged".

Every Infantry "Attack" (after 500 yards) should invariably be supported by guns at close ranges. (Fig 2, Plate II). This is true moral support.

A direct frontal attack however *is* occasionally necessary. It could not be undertaken against good troops with less than 10 or 8 to 1.

It is a question as to whether the assailants in these rare cases derive any benefit from firing.

A quick (not breathless) advance with the bayonet, without firing, to within 150 or 200 yards of the position, then a determined rush by the survivors, would be the surest and not necessarily the costliest way of succeeding.

For even the defenders require time to kill. The best way to reduce time is to close rapidly.

German experiences confirm this. But it requires the best troops. Even good troops under fire are apt to reply. And there is a certain point where the crack of the opposing rifle has a peculiar ominous sound making the stoutest heart jump. This is the point, at about 150 to 200 yards, at which many good bayonet attacks waver, fire, and fail. It requires the best troops and best leading to get over this moral bar. To better troops, and better led, Plevna and Shipka would have fallen at the first attack as assuredly as did the Redan or Tel-el-Kebir.

A conspicuous failure by good troops was the halt beyond Marie-aux-Chênes. A fireless determined advance would have been less costly, and the position would have been carried without crossing bayonets. To have attacked at all was a mistake, for the position would in any case have fallen to the "enveloping" attack which, though tardy, was sure.

Defenders, seeing a determined Fireless Bayonet Attack, realize that an overwhelming superiority of numbers exists. Fire as much as they will, whatever the losses they inflict, they know that in a few minutes they will receive no quarter if they stay. It is seldom they do.

The victorious defenders of the Shipka were thrust out of their equally strong entrenchment on the south side of the pass at the point of the bayonet, the advance having been made in close formations over long distances without a shot being fired. Nevertheless it was a bloodless victory.

Such deliberate Fireless Attacks are however seldom required, and are only justified when all other means fail and when the disproportion is great.

The most creditable victory is that gained with the least loss of life to either side, especially if the disproportion between belligerents is small.

The most discreditable defeat is that incurred through mistaken calculations as to the required numbers or the relative proportions. Want of intelligence is criminal at all times, but especially when life and death are at stake.

The following figures should be remembered by all concerned :—

(1). A Company acting singly can only "attack" a "sub-section" in front (in position). unless an "enveloping engage" is possible.

(2). A Battalion acting singly could 'engage' (enveloping) a position 200 yards long, but it would require at least *two* battalions to attack this space in front.

(3). A Brigade of four battalions would be able to cope with 400 yards of a position, if it can make a flank attack by which the defenders have to take up a new position and weaken the original one.

(4). A Brigade of four battalions can only hope to succeed in a front attack against 200 yards of a defended line with protected flanks.

Compare these figures with what is customary at camps of exercise and field days, and ponder!

4. *On the new Trajectory.*—Much has been claimed for the "grazing" attribute of the trajectory of the Lec-Metford.

These claims refer to the fact that there is no "first catch" for 500 yards (vide Theoretical Principles, Musketry Instruction, 1892, page 81, para. 2). With reference to this deduction it must be noted however that the position of the "Line of sight" is ignored.

The table at page 189 shews that for the 500 yards range the culminating point at 300 yards is 4·66 feet "*above line of sight.*" Now referring to the Diagram No. II (page 83), a "line of sight," commencing at 3 feet off the ground and aimed at the feet at 500 yards, passes 1·2 feet above the ground at 300 yards from the firer. This, added to the height of the culminating point, makes the trajectory really pass 5·8 feet above the ground. At 200 yards from the firer it passes 6·2 feet above the ground.—(Fig. e, Plate V.)

This means that if the Defenders fire from a height of only 3 feet off the ground, and are aiming at the feet of the attackers 500 yards distant, a man between 300 and 200 yards from the Defenders would be safe *standing*. If kneeling, or running stoop-

ing, he would be *below* the trajectory, after passing 400 yards from the Defenders to close up to their muzzles.—

This immunity rapidly increases with every foot of altitude of the Defenders' fire. Aiming at the feet at 500 yards from an elevation of 6 feet, immunity from "grazing" effect is secured *standing* at 350 yards from the Defenders.

An elevation of 12 feet gives security at 400 yards.

It is not to be expected that troops will under these circumstances be taught to aim "at the feet of an enemy 500 yards distant in the hope of hitting somebody somewhere between." They will as heretofore naturally aim at the firing line in front of which is nobody.

The advantages of the flat trajectory are chiefly in its greater powers of penetration; and in permitting the use of "fixed sights." Special musketry training will however be required to use these with full effect, and a good aim will be required now and always as heretofore to ensure good results.

The "dangerous space" has (by the tables) been certainly increased by 50 % over that of the M. H., but here also the measurements are throughout made in a horizontal plane.

It also diminishes rapidly with the elevation of the firing point.

Nevertheless, more than ever must now safety be found in presenting a distributed and small target to the enemy. It is imperative for men and officers to be taught and forced to *lie down* under fire. It goes against the grain to do so, as it is an effort, especially when heavily accoutred; but discipline will shew at its best when this remedy against annihilation is systematically practised and demanded. See Note 12. Men must of course kneel or even stand to see to fire, but must at once lie down again. A brick wall is no longer a protection, a shallow shelter trench is a snare.

5. *On firing up and down hill.*—The rifles are 'sighted' with reference to objects in a horizontal plane.

If aim be taken at an equally distant object above or below the horizontal plane, less elevation is required in both cases, until it becomes *nil* for objects in Zenith or Nadir. (Figure M, Plate V.) Object O in the H. E. is given the greatest, viz. the "Sighted" elevation. Objects O₁, at the same distance (r), but above and below, require therefore reduced elevation.

This fact is ignored on all our rifle ranges, for whatever the difference in altitude between the firing points and the targets, the measurements are carefully made along the hypotenuse.

A *slight* slope of the range or a slight difference of level between firing point and target makes a considerable difference in shooting. Out of two ranges which are side by side and seemingly with but little difference in slope, one may require a general reduction on the backsight of 25 yards over the other all along the range.

The necessary reduction should be obtained practically on every range, and either allowed for on the backsight, or added in yards to the measured distances for each firing point.

This reduction of elevation however applies only for differences of altitude at equal distances.

Plans, maps, range finders as a rule, give only the distance horizontally projected.

For instance, a crest line at O_2 would on a plan read the same distance as P. O. (that is r), whereas it is really P. O_2 , (that is $r + x$). The measurement x is readily obtained by clinometer or sextant.

The correct backsight elevation would in this case be the "sighted" one for the distance P. H($r + x$), *less* the allowance for the "slope on the range" as first explained.

This result may necessitate the bar of the backsight having to be raised *above* the 'sighted' line for the distance as found by the range finder, but the raising in this case is due to the object being at a greater *distance*, and not to elevation.

Practically then in the field (battle or sport), if the object is *either above or below* the horizontal plane, *add* to the "sights" (or aim high) for distance, if obtained by range finder or from a plan, but *deduct* from the "sights" (or aim below) for the distance as correctly estimated (on the slope) or corrected by aid of clinometer.

The exact difference must be left to the discretion of the individual until the backsights are supplied with "altitude" gauges (say for 10', 20', and 50 feet) as well as "wind gauges." The "altitude" gauges are by far the more important of the two, and could easily be added regimentally after having been worked out by authority. Correct elevation is everything, lateral variations are of no consequence.

6. *On Echelons.*—The systematic adoption of echelons for the relative positions of small bodies of troops in the Battle Area of the first line is impracticable. To adopt it in a "Drill" is therefore wrong.

The advantage claimed for them is that they procure immunity from the rush of bullets, usually making for the centre of the advance. The disadvantages are glaring.

A Battalion engaging on its own front cannot have companies in echelon "on the flanks" without overlapping and interfering with neighbouring corps in the Line of Battle.

If the supports and reserves are "echeloned" behind and *within* the Battalion Front, they will sooner or later offer a concentrated target liable to telling oblique fire (Plate V. Fig. g).

If the Battalion acts singly and "echelons" its reserves and supports *beyond* the original Battalion Front, then by the natural course of events the firing line, instead of being reinforced, will be prolonged and thus weakened. (Plate I. Figure f.)

With the Section-Column Formation the sections in rear can also when required be moved to one side or the other if there is room, and any special reason for it exists; but owing to the system of *feeding to the front whatever the relative positions of supports and reserves*, the leading section will always be reinforced and *never* prolonged.

Even against a savage foe are echelons to be avoided. For instance in example II. of some "Forms of Attack" recently published, great difficulty at once appears on having quickly to reform the "oblique flank" lines. A sudden forming "half-right" (or left) *must* leave yards of gaps between *each of the companies*. The quicker the movement has to be done, the more *steadfast will be the gaps* because the men, surprised, will in self-defence at once fire and halt where they first form up, and turn a deaf ear to all entreaties to close right and left. These gaps could be avoided by moving the inner pivot men further in and further up, but then one of the advantages claimed for this oblique flank formation over the "square" formation (viz. that the flanks whilst being flanks can still fire to the front) ceases to be valid.

Echelons of any kind for minor tactics are clearly impracticable and should be studiously avoided.—Savages should be met with a solid front in every direction and in formations which allow *no room for gaps*.—Even short solid faces giving a continuous fire will repel any number of savages. It is merely a matter of time. The smallest gap on the other hand means probable victory to the savages by dint of mere weight of flesh.

7. *Defence Sections*.—In the preceding note (4) the rapid diminution of the "grazing" propensity of the new rifle trajectory, with every foot of altitude of the firing point, was shewn. The fullest grazing effect is obtained by having the Line of Sight coincident with Plane of Site when horizontal (Plate V, figure a). This also holds good if the plane is *slightly* inclined (as in figure b). If much inclined (figure c), the vertical position of the advancer gives the required immunity from 'grazing' effects. No grazing effect

whatever is obtainable from a defensive position of the section in Figure d, if the firing point is at the crest. The most effective infantry fire will be from the foot of the exterior slope.

Elevation is of the greatest importance to the General and his staff. It is of some importance to guns. It is of little or no importance to Infantry. Yet are disciplined Infantry ever seen manning the highest sky line *à la Afghan*!

Infantry entrenched below where a good grazing line for 500 to 700 yards to the front is obtainable is in a position which will give the best results for a defence of a section in figure d. But to adopt it requires nerve on the part of the commander, and the best troops. Supports or reserves can always man the crest at the last (the assault stage), and the front Firing Line can fall back when required into prepared places under cover of the fire from the crest. Even if bayonets are crossed, the firing line has a considerable advantage of ground over the attackers.

The sky line (crest) forms a conspicuous target for the attacker's guns. The trench at the foot, being unseen, is safe. To deliberately take up and entrench a sky line then as an only line of defence is a sign of weakness; either from want of confidence of the Commander in himself, or in the quality of his troops.

It is only justifiable when it is a "tier," or is intended for the last stand against assault, or as a Final Line of resistance for the supports.

It is also permissible when a mere "displayed defence" is intended, as in a rear guard action, and when the position is intended to be evacuated at the first approach of the enemy's Attack.

The disclosure of Infantry positions and "tiers" by firing at long ranges is foolish, it being what an attacking General would pray for, and often willingly pay for out of his own pocket. Defending Infantry should only fire with destructive effect. Six to eight hundred yards being the first permissible distance.

Only when the position is well indicated, as in the case of permanent fortification, is long volley firing allowable.

8. *On the use of guns.*—The attackers with their superiority of guns have no need to fear indicating their actual position.

They should beware however of coming into action in obviously *advantageous positions*, for such are marked down by the defenders who with a few rounds might do considerable damage, and thus rapidly reduce the numerical superiority.

They should direct their fire on the Defenders' guns whenever these disclose themselves. They should do their utmost to induce them to "reply" so as to disable them, and thus draw the teeth of the defence at the Assault stage.

They should support the "Attack" at the closest distance to the enemy, regardless of loss to themselves. (Plate II). Military history teaches that they can advance to within 400 or 300 yards of the position, fight well, and yet live.

The position can only fall to the assaulting Infantry. Guns cannot take a position, therefore if the defenders have actually only few guns (say 2 with a Battalion, 6 with a Brigade), they must nurse their guns and only use them to the full against the attacking Infantry, and then regardless of the enemy's gun fire.

They should not fire a round against the attackers' guns unless at previously ascertained range. A few rapid rounds, before the range is found by the enemy, may be advisable, though risky; but as soon as they open fire, the defenders should withdraw their guns to other (prepared and masked) positions, and remain silent till the critical moment for "shelling and casing" the "attacking" Infantry arrives.

If the attackers have no definite target to fire at, they will do but little damage and probably not fire at all. If the defenders do not expose their guns, the attackers will have no target to fire at. A silent defence, that is one "lying low," is the most telling. It requires nerve. It is English.

When the forces are large and the guns in the Battle Area are numbered by many hundreds, then the Defenders may endeavour to use their guns with the object of reducing the enemy's artillery and infantry at long ranges. The loss of 20 or 30 guns has then not much effect on the issue of the infantry action; nursing is unnecessary.

But we shall probably, as heretofore, always fight with the numerical odds greatly against us. It also is English. The tactics therefore best suited to our numbers in war are the best to teach and practise in times of peace. Long bowls in the defence, means exposure of position with but little damage to the enemy.

An undecipherable "position" is the one that causes the greatest delay, annoyance, and eventual loss to the attackers.

9. *On Field Practices (Skeletons).*—"Field Days" must be understood to consist of Field "Practices" and "manœuvres."

Field Practices should always be in connection with "skeletons" both in practising the attack as well as the defence. Skeletons are at present generally limited to representing defensive forces. This is a professional error.

A good "Attack" once begun, must be driven home through the assault stage to the position (and sometimes beyond). All attack "drill" should be for the object of bringing *this* fact home to the understanding.

On the other hand a good "Defence" requires that the Defenders remain steadily in their posts till disabled, or till ordered to retire. All defence "drill" should be for bringing *this* fact home also.

It is our general custom at Camps of Exercises and Manœuvres with two Forces to go counter to both these facts. By our rules of not approaching to within a hundred yards, the "Assault" stage and the "after rallying" remain frequently unpractised. This custom causes our men to be "drilled to fail." Both the "Attack" and "Defence" at all training field practices should therefore be in connection with Skeletons. A skeleton "Attack" should, at the assault stage, come close up (half a dozen yards) of the position. Defenders may frequently have to *move* whilst engaged. This requires practice. It may be wanted to give up the position at an early stage and to make an orderly retreat to another (as in the case of a rear guard); or certain posts of the position may have to be reinforced or changed rapidly; a forward "tier" may require to be brought back to another position; and a flank strengthened by withdrawal from elsewhere; reinforcing from the rear may be required, etc. etc.

The Drill and practice of this *with avoidable and unavoidable noise, excitement, and casualties* (especially among the section and company commanders, who are frequently more exposed than the men) is most desirable. A skeleton enemy permits of this being done without bad training.

"Skeletons" require to be well handled. Plenty of officers should be present, especially to see that the "Attack" is carried on under instructions—and intelligently.

Blank ammunition should be used lavishly at all Field Practices. (Not at Manœuvres, see note 10.)

10. *On Manœuvres.*—"Manœuvres" are distinct from "Field Practices." In the latter only should a "skeleton" enemy be used; and the task given done over and over again until satisfactorily done. Manœuvres are for practising officers in generalship and the men in endurance. The best *manœuvres* are those which do *not* end in Attack and Assault.

Equal forces may manœuvre but can not Attack each another. A Company Commander may so manœuvre that he brings three of his sections to attack one section of the opposing company. That is a successful "manœuvre", and though the attack might fail through unforeseen circumstances (for instance such as a mine blowing his men into the air or a deep moat drowning them), the Commander's manœuvring powers are established, even if the fortune of war is against him.

Manœuvring may be successfully practised without a shot being fired, and here the umpire rules as to distances must be implicitly adhered to. The Attack and Assault should be strictly *forbidden*.

The Engage only should be permitted up to 500 yards.

An umpire must always be present to decide the probable issue of any contemplated "Attack". Dice should be freely used, coupled with calculated odds.

Blank need not be much used at manœuvres. At Field Practices, blank should be supplied to the skeleton for spare use, but should be used lavishly by all the units in training. Smokeless powder or cordite is more noisy than black powder. A free use of blank will tend much towards obtaining a good fire discipline in the Attack and in the Defence.

In Manœuvres the enemy must be "fired on" (sparingly), as soon as "fire effect" is to be appealed to as a factor favourable to the desired issue. This gives the advantages and disadvantages due to "exposing" the actual dispositions both in Attack and Defence.

11. *Outposts*.—Unless the ground or special circumstances dictate otherwise, companies on outpost duty will have half a company (two sections) in support; and the units (four) of the other (two) sections will as 'groups' furnish, if weak one, and if strong, two sentries (double) and the necessary connecting sentries. A company supplying its own support cannot take up more front than ten yards per file of its total strength, on outpost duty at one time.

12. *Inspections*.—To better test the "Battle" capabilities of the companies the "Rush Past" will be frequently practised by Wing Commanders.

The Camp colours will be placed as usual. The companies in heavy marching order will be drawn up in mass of Section-Columns and double one thousand yards. They will then be drawn up in mass of Section-Columns on the alignment between the 1st and 2nd points. On the signal to 'advance' the front section will advance by order of the senior Fire-unit Commander, at a *quick* pace, and extend rank entire smartly to the full Company Battle Front. When a few paces have been traversed the *two* Fire-unit Commanders will each give the command "Rush." The men will fly over the ground, keeping bodies horizontal, knees bent. At about 20 yards each unit Commander will give the word "lie down" (or "kneel"), and fire two or three blank volleys on the words "Present-Fire", "Present-Fire", "Present-Fire", in quick succession. The men in the firing line reloading immediately after

discharge, and without word of command. They are "ready". The object need not be named, as at the rushing it is sufficiently well defined. Two rushes will be made. Captains (and Subadars) will stand by the Inspecting Officer as their companies go by. The Subalterns rush by, junior with the leading section, the senior with the rear, each 5 paces in front of the outer flank.

The section will then close (on the march), and move into position well behind the alignment between the 3rd and 4th companies, and change ranks and stand at ease.

When all the companies have "rushed past" in this manner with sections in a general line, they will "rush past" with sections of alternate and reinforced "fire units". One section to be reinforced by the one next in rear of the same or of another company. 'reinforcement' to be done 'on the march', as soon as the leading section has as before extended to the Company Battle Front. The rushes to be 20 yards at a time by each fire "unit." The reinforced unit Commanders taking command.

The same simple words of command as before will be used. As each firing line has only two possible commanders, one on the right the other on the left, the direction from which the volley command comes is sufficient to indicate if the right or left "fire unit" is being addressed.

The men must be trained to recognise their commander's voice.

Blank ammunition should be invariably used, and the volley should occasionally play during the "rush past", not for the purpose of display, but for the sake of noise and distraction to which it is well to accustom the men.

The following points to be noted :—

1. A smart step at the quick.
2. An energetic "rush," bodies low.
3. A smart "lie down" and "rise."
4. "Dressing."
5. Intervals (a total 40 yards exact).
6. Low and smart word of command.
7. Exact volley.
8. Rapidity of successive volleys.

A greater divergence of efficiency will be noticed between regiments if inspected on these lines, than on those ordinary ones in vogue hitherto. National characteristics will have to be overcome and others developed. The Pathan, by nature "nippy", should perform this Rush Past "excellently", the Sikh of a more "stolid" nature will find far greater difficulty, but it *must* be insisted

as it is the only method of protection left. The Punjabi Mussulman could be drilled into some degree of both these characteristics. The British Soldier has them both well blended, hence his inestimable value.

These different characteristics should on no account be lost sight of when making Inspectionary comparisons.

As lying down is the *only* means of protection left us now, it must be insisted on, and the men's bodies and minds made thoroughly at home with the fact.

On Service it will be often necessary to kneel or stand so as to see the enemy to fire at him, but when not firing men *must* lie down in the whole bullet area. Bushes, trees, low walls, and trenches are no protection whatever now, nothing but a flat undignified, but still necessary, position is of any use.

To neglect this training is to be guilty of manslaughter if not murder.

Fortunately the "Rush" will not often be required on Service, as a quiet advance without unnecessarily taking it out of the men is the best for effective fire, but occasion will sometimes arise when every nerve has to be strained to secure one's object. A regiment that can "Rush Past" well will also be able to advance well, quietly, and have the additional "Rush" training in reserve in case of dire need.

The "Rush Past" would make a good entry at future "Assaults-at-Arms."

APPENDIX I.

P. R. O. No. 156.

Interior Organization.—At present there exist three kinds of "sections" in each company, viz. the "verandah" or "barrack room" section, the "musketry" or "register" section, and the "parade" or "size" section. This system, which has worked well hitherto, must be altered to suit the demands of the future.

The companies will therefore be divided into four permanent sections for all purposes as follows:—

1. Each company completed to full strength will fall in, in double rank, including recruits and all acting musicians, omitting drummers and acting drummers.
2. Four equal divisions will then be made, and be permanently numbered as "sections" from right to left.
3. Vacancies will be filled up by recruits suitable in size, who should be distributed equally among the sections.
4. Sections when parading will for all parades fall in with the men sized from outer flanks to inner.
5. Each section will have 4 unit Commanders:—

One Havildar.

One Lance-Havildar or Naick.

One Naick or Lance-Naick.

One Lance-Naick or special unit Commander.

The company staff will be permanently posted to their sections.—They will not be removed except for promotion or other very special reasons, and never without the sanction of the Commanding Officer which is to be notified in Regimental Orders.

5. The selection of "specials" (unit Commanders) is not restricted to promising young men fit for promotion in every respect, but may be from among steady old soldiers (even uneducated), who are able merely to command a "fire unit" in the field and control its fire.

These "specials" wear a distinguishing badge (as selected men), but will do duty (if under 15 years service) as sepoy.

Every unit must have two unit Commanders (whether non-commissioned officer or special) available for guard duties.

Non-commissioned officers in regimental employ must have their places filled up by "specials." These specials will do duty in the rank as usual, but take command of their units in the barrack room and in extended formation, when the non-commissioned officers happen to be absent.

The badge will be a "half-lance stripe" on the right arm, in khaki only, supplied gratis from Quarter-Master's stores.

6. In the barrack room the men's beds will be in analagous positions. The front rank on the south side.—The two senior non-commissioned officers' beds will be in the corresponding angles, and the two junior in the centre of the barrack opposite each other.—Friends of long standing may have their beds together (as exceptional cases) in the same section.

7. Each man will thus have his place fixed permanently in the ranks and in the barrack room.

8. For purposes of barrack supervision, drill, manœuvres, and "class instruction", each section will be further sub-divided into two "units".—The first and third senior non-commissioned officers to be in charge of the "outer" units, the second and fourth of the "inner" units. The drummers with the outer units.

APPENDIX II.

Interior Organization.—The Section Command Staff will train their units in the following exercises:—

TABLE A. { Setting up Drill, and Squad Drill, Manual, Firing, Bayonet, Physical Drill, Running Drill, Battle Formations.

They will further be, collectively and individually, responsible that the men in their sections are thoroughly instructed in:—

TABLE B. { Permanent Regimental Orders.
Articles of War.
Musketry.
Orderly Duties.
Sentry Go.

The men will assemble by sections once a week for "class" instruction by their section commanders (or unit commanders if more than 10 men or 12 men are present) under the supervision of their native officers, who are responsible to the Wing Commander that the section commanders are themselves well qualified. Any time, any dress, without interfering with duties or parade.

The "class" instruction will cover in each week the subjects in table A and in each month those in table B.

Native Officers will, previous to their class assembly, get the instructors (all the N. C. Os. and specials) together, and go through the subjects—

The following text books will be supplied and form part of the company equipment:—

Manual and Firing	1 copy per section
Transport Regulations	1 " " coy (P. H.)
Musketry	1 " " section.
Company training	1 " " "

Escalading	1	"	"	Wing (S. N. O.)
Field exercise entire	1	"	"	coy. (P. H.)
" " squad	1	"	"	section.
Articles of war	1	"	"	Wing (N. O.)
V. P. R. O.	1	"	"	coy.
Sentry G. O.	1	"	"	unit.

Wing Commanders will at once indent on the Quarter-Master for the necessary books to complete the authorized scale, and they are held responsible that books are preserved in good order with latest corrections.

The books will be laid out at each Inspection (Wing; C. O; or G. O. C.).

The Quarter-Master will have them uniformly bound in canvas binding and properly marked as follows :—

45th Sikha.

A. II. I.

to read A. Company, No. 2 section, N . 1 unit.



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x 20



- 1. Cast iron
- 2. Steel
- 3. Brass
- 4. Copper
- 5. Aluminum
- 6. Zinc
- 7. Lead
- 8. Tin
- 9. Silver
- 10. Gold



Table 1. The results of the analysis of variance for the effect of the treatment on the yield of the crop.

Treatment	Yield (kg/ha)	Standard Error	Significance
Control	12.5	0.5	
T1	15.2	0.4	
T2	18.7	0.3	
T3	21.3	0.2	
T4	24.8	0.1	



Table 17

Time of day	Time of day	Time of day
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10	11	12
13	14	15
16	17	18
19	20	21
22	23	24



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Table I

Table II

Table IV

PLATE V



PLATE 4



Plate I



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INFANTRY ATTACK FORMATIONS.

Some remarks on direction, and attack in two echelons.

BY LIEUT. A. A. E. CAMPBELL, *25th Punjab Infantry.*

It is generally conceded that the normal attack formation of the infantry drill of 1889 has proved a failure on the drill ground and at manœuvres, and it seems not unlikely, to judge from the book provisionally issued in 1892, that the new infantry drill will contain no normal formation whatever. Whether this is desirable or not is at present and will for long remain a matter of opinion, and it is not proposed to touch upon the subject in this paper, nor in speaking of the 1889 formation do I desire to "flog a dead horse." But in view of the time in the near future when every regiment will practise an "attack formation" of its own pattern, I should like to bring to notice two important principles, in regard to which the 1889 formation has conspicuously failed, but in spite of the free hand the preface of the book gives, still in many quarters prevails. It may be that there is virtue in these two principles of the 1889 edition, and that they will find supporters. Still more likely, it may be that the writer's opinion of them is wrong in itself. The pages of this journal seldom contain a discussion, and it would be of interest and value to know what officers, after four years' trial, think on these two important points. They are--

(1). The plan laid down for the direction of the advance of the attacking line.

(2). When the advance by rushes commences, the principle of that advance.

I will take these two subjects in succession.

(1.) In a lecture given at the Royal U. S. Institution on the 18th February 1891, by Colonel Upton Prior—in the course of which, by the bye, and of the discussion, there was much plain speaking about the 1889 attack formation—there occurs a passage which graphically describes the faultiness of the plan for the direction of the advance, to which I take objection. I will not therefore apologize for quoting it.

"Though there is a company of direction to regulate the pace, yet there is no one directing point; each company marches by its own centre on an objective point of its own; thus we find that in a brigade we have eight different lines of advance before the reserves have reinforced the supports, and when all the reserves are absorbed in the firing line we should have sixteen lines of advance, viz., one for each company. Taking eight lines even, it is not likely that these eight lines of advance have been exactly

parallel originally, but supposing they were, and the ground like a billiard table, with well marked objective points on which to march, the manœuvre would not by any means be an easy one. But when the advance is to take place under fire, over ground probably undulating, in crossing which the files of direction and N. C. O.'s supervising them must occasionally lose sight of their objective points, to say nothing of the confusion caused by obstacles, as ditches, small spinneys, hedges, or perhaps foggy weather, and of the advance being continually interrupted by losses, and the arrival of reinforcements in the firing line, I think enough has been said to show that the chances of right lines of direction either crossing or going away from each other, with the consequent jamming or over-extending of men, is more than great—it is quite impracticable."

Every one knows that this is exactly what always happens—sections invariably cross and overlap, or go away from one another and get jammed or over-extended. The centre of gravity of the line of attack is lost in the anxiety of each company to keep its own line of advance and of each man to feel into the centre file or file of direction of his company. The confusion when two or more battalions are deployed is simply lamentable.

(2.) The second point I wished to refer to was the principle on which the advance by rushes is made. The principle of rushes in the normal formation of 1889 is to make them "*en échiquier*" or checker-wise, each company moving on its own line of direction and independently, except that it is supposed to conform to the movements of the company of direction.

In the same year as saw the publication of the last infantry drill regulations, there appeared a translation of Prince Kraft's Letters on Infantry. I opened my last "point" with a quotation, and will beg permission to do so again now in support of my contention. (Letter XII, pp. 162-3, of the translation by Colonel Walford.)

"I have seen still more unpractical advances by rushes practised. I have seen the firing line divided into three parts, of which first one, then the second, and at last the third ran forward. This is opposed to the moral impulse of good troops; since when a part of the skirmishers has taken up its position near to the enemy and has opened fire, honour and comradeship compel all the other skirmishers to hurry up to them, in order to share their danger shoulder to shoulder and to fight with them. The moment when the echelon which has gone first to the front opens its fire, is the most favourable for *all the others* to gain ground quickly, since the enemy will at this moment direct all his rifles at those skirmishers who have the first advanced."

"One experiment which I have seen made is yet more impracticable than the above ; a firing line was divided into a still greater number of fractions, and the even and the odd sections advanced alternately by rushes, so that they really advanced *en échiquier*. In this case the centre swarms of the fraction which at first lay down, found their field of fire so narrowed on both sides by their comrades who had run forward, that they could do little or nothing. For this reason at the peace exercises which were carried out in my command, I never allowed a firing line, which was advancing by rushes against a single object, to be divided into more than two echelons."

1. The principle of the direction of the advance to the attack should be—one objective point only for the firing line of each battalion, and one file of direction.

2. The principle of the advance by rushes should be—an advance in two echelons only, one leading, the other aligning itself upon it.

It is scarcely worth while pausing to enquire why the battalion should be the unit chosen for the application of the first principle enunciated. It has already been demonstrated that a company is too small a unit to act on a line of direction of its own while forming part of a battalion attacking. As to a brigade, one need only call to mind an advance in line deployed of three or four battalions, each marching by its own centre and trusting to cadence for dressing, in order to understand that to put the centre of gravity of a firing line in the centre of any wider extent of line than a battalion front, would result in the very confusion and jamming which we wish to avoid.

Having therefore assumed the correctness of our first principle, the solution of the method of carrying out the second is limited to the consideration of what is the best formation in two echelons, in which a battalion can advance under fire to the assault of a position. The system advocated may be summarized thus, "Advance in short echelon from the centre."

The file of direction is the centre file of the firing line.

The two centre sections, half-companies, or companies, of the firing line (as the case may be during the progress of the advance) lead the advance throughout. The remainder cover the leading echelon's advance with fire, and conform to its movements. Every company marches by its inner flank and feels into it as casualties occur.

The supports reinforce on the outer flanks of the companies to which they belong; the reserves on the outer flanks of the companies to which they form the support.

It may be remarked *en passant*, that to reinforce with the reserves on the outer flanks of the *line*, as proposed by Colonel Prior in the lecture already referred to, would deprive the firing line of that direct support from the rear which all experience in European warfare shows to be necessary for success. It would lead to an undue prolongation of the line very often. Gaps in the firing line would remain unfilled, and just at the time when the line requires most "stiffening," there would be no troops to rely upon but the second line 200 yards in rear. Colonel Prior also advocates advancing in two echelons, but his echelons are *ranks*.

On page 207, infantry drill 1889, there are enumerated six conditions to be kept in view in adopting formations of attack against disciplined and well-armed troops. There is not one of these conditions that the proposed plan does not fairly meet.

There is nothing new under the sun, and to lay claim to novelty in an attack formation based on the familiar, "Advance in short echelon from the centre," might well raise a smile. The writer neither invented the well known parade manoeuvre, nor originated its practical application to the attack. He only desires to bring the idea to the notice of others who may have better and sounder plans, and will take the trouble to criticize the above, and give us the benefit of their own experience.

To minimize confusion simplicity is aimed at in the foregoing, but "in war to be simple is the difficulty."

A TACTICAL RETROSPECT OF THE YEARS 1859 to 1890, WITH SPECIAL REFERENCE TO INFANTRY.

Translated from the German BY LIEUTENANT B. STRACHEY,
2nd (P. W. O.) Gurkhas, Interpreter in German.

(Continued from Journal for February.)

We will now turn to the use of large bodies, armed with the latest firearms, in the fight.

With regard to the deployment, what has already been said before may be again referred to. In spite of the artillery effect, we must before the actual fight try to lead the troops forward in as compact a body as possible. A deployment into companies, with the manifold use of lines, was already unavoidable before the newest improvements of the artillery were introduced. To open out into lines of skirmishers to lessen the effect of artillery fire, would only make us disperse before commencing our fight proper. Infantry which can no longer move in line under fire is useless. It will however be able to hold its own, if the spirit, which must be encouraged in every body of troops, is cultivated, and if it is skilfully led.

To banish company columns altogether here would be faulty. What formations should be adopted depends entirely on the ground. Large bodies, even battalions, have been moved for some years on points on the ground. This is certainly good, when these exist. On the parade ground there is of course no difficulty, but if a battlefield be imagined which is generally unknown ground, it must be admitted that these points, especially in enclosed country, are often not obtainable at all, and that it is often impossible to point them out to all advancing companies without misunderstandings occurring, which may lead to very unpleasant results. In such cases therefore the only thing possible seems to be for one company to move on a point carefully pointed out, and for the other companies to keep in line with it.

The drill regulations lay down, that, generally speaking, fighting formations should be deep. A line of skirmishers, supported by small bodies in rear, feeds the fight in the attack; it advances by rushes or also in quick time, taking advantage of any cover; it is reinforced by the nearest closed bodies of troops, and sometimes also by the larger detachments, which follow in the 2nd and 3rd lines; how many reserves are still left in hand depends on the obstinacy of the defence. If it is now required to carry out the attack, the closed lines in rear are brought up nearer to the firing line, and led forward to the attack to carry the firing line forward with them. The final rush is to be carried

out with the greatest energy and without a check.

It is also certainly permissible for the firing for line to seize the initiative, and make the final rush without waiting for the troops in rear.

This will be a very frequent form of attack, often caused by the independent decision of the officers in the firing line. The drill regulations however say that the attack should be generally regulated from the rear.

It also very correctly lays stress on flanking movements. It further recognizes that fire is the chief element in the fight, so that without a decided superiority of it an attack has no chance of success.

The drill regulations lay down that if an attack is really pushed on right up to the enemy, it will always succeed. This has been stated before, but it is quite correct and justifiable to mention it in the drill regulations. If the attack is carried right up to the enemy, then it has succeeded, for experience tells us that the defenders will seldom engage themselves in a hand-to-hand fight. We see no contradiction in the following statement, which refers to the strength of a frontal defence, and our recognized excellent shooting. But it cannot be denied, that in a real fight, matters will often turn out differently. We saw well conducted attacks on the German side and on the French side succeed in 1870.

We also believe that the superiority of our infantry as regards shooting will no longer be so marked as hitherto on account of the flat trajectory of the present time.

The maxims of the drill regulations may thus be said to meet the demands of the tactical school, founded on the experiences of the wars of 1866 and 1871, although it does not advise firing during the storming of a position, as recommended by most known writers.

On account however of the latest alterations in firearms, doubts have been heard as to the possibility of carrying out the attack laid down in the drill regulations. The following are most of the points to which attention has been drawn:—

- (1.) Even the first dispositions for an attack have become more difficult on account of the modern effect of fire, and especially of artillery fire.

- (2.) The increased range for which the rifle can be used, and the flatness of the trajectory, demand greater distances.

- (3.) Fighting in a deep formation is a doubtful procedure, because the lines in rear will suffer too much, whilst, if they do not fire, they are of little or no use.

Therefore the attack should at once be developed on a broad front in dense lines of skirmishers, with the prominent object, from the first, to outflank the enemy.

(4.) The fight should be decided by fire and envelopment. The enemy should be shot out of his position.

(5.) The maxim to get as near as possible to the enemy without firing is objected to, on the plea that the advantage of being able to use the rifle at long ranges should be made the most of.

We have already discussed the first sentence.

The second may, generally speaking, be said to be correct.

First, with reference to the distance of the lines in rear from the firing line.

The increased flatness of the trajectory produces greater dangerous zones and a greater number of chance hits. If we were of the opinion after 1870 that the supports should be as far away from the firing line as possible, that is to say as far as would be compatible with tactical interests, we are now in favour of still greater distances. If the *terrain* does not offer special advantages of cover, the supports and lines in rear must keep at greater distances than hitherto in the containing action, and in the phases of the attack which may be termed "the working up to the position." It therefore follows that the skirmisher line must be a dense one from the beginning, to be able to sustain the fire-fight unsupported and without disadvantages as long as possible. But the tactical interest here is in supporting the firing line in every formation. To be able to render this support, it is necessary that the supports and on occasions the next line in rear should approach nearer to the firing line in critical moments of the fight. And it must come to and can come to this, that troops of this line remain under the fire of the enemy without shooting their comrades in the back.

This discipline must be the combined result of our training and martial spirit, with which we must constantly be trying to inspire the soldier and every body of troops.

As has lately been stated in one quarter, the bringing up of reinforcements to the firing line through the longer dangerous zones will certainly present difficulties, which must be diminished by the reinforcements advancing alternately by rushes.

Fighting in a deep formation means the formation of several bodies of troops behind each other to equalize losses, to advance to the attack with the lines in rear, to make flank attacks with these lines and to meet the enemy's enveloping movements with them, and finally to put a stop to an enemy's front attack in force.

It cannot be denied (and we long ago pointed it out), that an unskilful and exaggerated application of the maxim "to fight in a deep formation" withholds from the firing line the necessary strength.

Cases have occurred, and we ourselves have experienced them in the field, when the most ingenious tactical combination possible was to dissolve at once the whole force into one firing line, so as to oppose the enemy with a mighty effect, and to deceive him as to our numbers. Also the argument holds good, that the heightened effect of our arms, *i.e.*, the arms of all powers, increases the power of defence and attack of the firing line. Deceiving and retarding the firing line can more easily be carried out than formerly. But if the deployment into long lines with the object of immediately displaying greater breadth than the enemy and of outflanking him is laid down as a recognised bold principle, we cannot agree with it. The advocates of this idea preach "envelopment." They say themselves that they do not introduce anything new, but they are of opinion that the envelopment has become still more effective by the newest firearms.

Many very artificial representations of the fight have been tried. It certainly can do no harm to work out a battle and the effect of the different arms in a graphic and mathematical manner, but such performances must not be too highly valued in connection with the real fight. We must first of all remark, that the deployment on the broadest front in large battles has its limit from the space point of view. On how broad a front will we extend ourselves in a battle of 200,000 infantry on each side? And of course the advocates of this opinion know very well that large reserves are kept back, but even not counting these, the extension would be an enormous one, if every battalion were to act as proposed. We would warn those who seek to introduce new linear tactics.

Further the envelopment will only be effective in large battles by the movement of large bodies, and these also do not come into contact with a flank, but with the fire-front of the enemy, in some manner established. Only here could as a rule the maxim of the envelopment be proved effective by the tactical conduct of the infantry. It is true, that at Sedan we enveloped an enemy numbering 134,000 with 168,000 men, and forced them to capitulate; but two circumstances favoured us, leaving the exceptional genius of our leader quite out of the question. One was the Meuse, which covered a long part of our line, and the other our very superior artillery, (which otherwise was nearly equalized by the superior *chassepôt*, but) which here produced, just by the enveloping position

it had taken up, a special effect. We have not always a Meuse, nor shall we always have wavering leadership opposed to us, nor have we now different arms. We know that our "arguments against" are not new, but it was necessary to recall them to memory.

But now we must lay stress on a very grave doubt as to the advisability of this wide extension of the infantry.

In 1866 we did not run out of ammunition, in 1870-71 we sometimes ran out of ammunition. We must consider that in wars of the future, we shall still oftener run out of ammunition in spite of the increased number of cartridges we shall carry. The question of supporting is not merely a question of replenishing ammunition.

Neither the fire-discipline of our men, which will in the fight be reduced to a modest standard in the best body of troops, nor the precautions we take to bring up ammunition, will save us from the absence of this replenishing of ammunition. The ammunition *waggons* can follow us up to a few thousand metres. The ammunition *columns* can only be brought close up in defensive positions. "But," one hears, "the troops must take over the waggon ammunition if they are going to fight." Very good, if the battle is fought on the same day. But supposing the battle is not fought on the same day? Then the men have more cartridges than they can carry, and who knows how many of these men rid themselves of their burden before the ammunition can be returned to the waggons? These are supposed to return to the ammunition columns when they have handed over their cartridges to the troops. That this is very difficult is very clear, and it is unlikely that the troops will receive a fresh supply of ammunition from the columns "on the same day."

Let us then take it for granted that the battalions are provided with ammunition for the day of battle, i.e. they receive the ammunition from the waggons. But even then we have no security that it will be sufficient.

If at this moment, when the fire becomes feebler, an enterprising enemy makes a mighty forward movement, the thin long line will be broken notwithstanding our magazine rifles. May the advocates of this line remember the experiences of war, the swaying backwards and forwards of both sides at Wörth, Spicheren, and on the Meuse on the 18th of August! Sudden forward movements which take the enemy by surprise will always be effective; the bayonet is not dead and must not die, if our infantry is to retain its superiority, for the value of good infantry consists in having many qualities. If the first line has run out of ammuni-

tion, the attack can only be warded off by supports or a line in rear, therefore we cannot give up fighting in a deep formation in the manner often latterly suggested. Napoleon's words, "*Le feu est tout, le reste est peu de chose*," only applied to resisting cavalry charges. They may be now adopted for general fighting, but still the bayonet is always "something." We must not lose consciousness of its use. Let us prepare our officers to observe when the enemy's fire diminishes. We see an important factor of the present mode of fighting in the recognition of the moment when to attack with the bayonet.

To consider the 5th argument. That the rifle should be used at long distances also in the attack is always the decided opinion, whenever a fresh improvement is made to the arms. The reasons given have something very captivating about them, and it seems as if one could almost prove to the opposition their want of logic, but here also one thing is forgotten, *i.e.* the impressions the fight and the danger make on the minds of mankind.

To lay down fixed distances is not well possible. On a plain the distances may be increased by 150 to 300 metres in comparison with former rules. If we go a step further and begin to fire at 800 to 1,200 metres, and in addition to this, if we extend ourselves too much on a broad front and seek to drive the enemy from his position by the fire of enveloping troops, only without direct attacks, then we shall not have struck a decisive blow at the end of the day. To make up for it in the night (although there are some brilliant examples of great undertakings of this kind, for instance Laon and Hochkirch) will be a very doubtful matter, which can just as well end in the total rout of the attacking side, as in its victory.

The objections to long range fire in the attack, which we have also formerly distinctly specified, but which have been quite forgotten, or purposely left in the background by the new advocates, are as follows :—

The influence of danger lessens the physical and mental capabilities of mankind. The soldier gets into a worse position, sees worse, and aims worse in the excitement of the fight. But it is also necessary that the rifleman should see—not only the officer with his field glasses.

The surface beaten by the bullets will therefore be a large one, and will make a large piece of *terrain* unsafe, but the effect of long range fire will seldom be terrible. The morale or the mental state of the troops will suffer, if in the attack fire is opened at 1,000 metres, for the frequent halts injure in every man the idea of attack, and for this reason that the fire-fights will always con-

tinue for a longer time than originally planned. At every halt they will cause loss of mental power, and also often greater losses than an advance by rushes up to a distance from where we can pour in a really terrible fire. For the attackers generally do not know the distances as well as the defenders. The fire of the latter must therefore be more effective at long ranges than that of the attackers. Then in every army a certain number will keep company with the dead and wounded, and these cowards are much more easily controlled when the halts are short and the advance is as uninterrupted as possible.

By the frequently repeated fire-fight the ammunition runs short. This is a very important point. We have already pointed out above the difficulties which are experienced with regard to the supply of ammunition. It is therefore quite right to save up the rounds in the fight as much as possible. To effect this saving by the sole means of training the soldier to fire-discipline is not possible. We must arrange our mode of fighting accordingly. The frequent application of fire over 700 metres is to court waste. Our object must always be to suddenly pour in a destructive fire in order to bring about the decision in the shortest possible time. That is the most advantageous thing a leader can do. We know very well that fire-fights last in reality a very long time, but if we introduce long range fire, they will last even much longer, and the strength to fight out the battle at close quarters will fail at the last. He of course, who is of the opinion that a fight can be decided with long range fire, can dispense with fighting at close quarters and may thus try it. We say—A pitiable way of fighting a battle. It may be compared in advance as regards the absence of any decisive effects, tactically, with the cordon system of the Bavarian war of succession, or strategically, with the campaigns of 1793 and 1794.

The latest advocates of long range fire believe they play a powerful trump card, when they ask—"Why have we a rifle that will carry to 3,200 metres, if we are not going to take any advantage of this power"? With regard to the great distances, the bullets *must* fly so far, as we want to have a rifle with the flattest trajectory and the greatest penetration. We also require the present rifle on certain occasions, principally when on the defensive, to be able to shoot at distances from 1,500 to 2,000 metres from safe positions, particularly fortresses, and so as not to be at a disadvantage by a less flat trajectory, which of course makes a bad impression on the troops. To draw the conclusion from this, that we should always take advantage of the tremendous distance the rifle carries, is altogether wrong, because in the fight

a number of other factors make themselves felt. If we realise what inferior troops every army will now produce for warlike purposes, the more justified is the desire for fire tactics, which will prevent waste and keep the mental powers of the men at their best. Part II, No. 37, of the drill regulations, lays stress on practising economy with ammunition, Part II, No. 130, of the new edition of the drill regulations, which deals with shooting at large marks and which has been mentioned by the advocates of long range fire in support of this theory, has nothing particular to do with the use of fire in the attack. Long range fire can certainly be used at large marks, but only from a position or when on the defensive.

It is apparent from our remarks that we do not agree with the opinions expressed of late on the attack, and on the effect of minor firearms in connection with it.

Be the enveloping movement extended ever so far, a weaker front of the enemy will as a rule be met with, which will finally in many cases have to be attacked to make room elsewhere, to strike a decisive blow for a certain purpose or before the evening, or because the conditions of the *terrain* prevent any further envelopment. If we no longer consider this form of attack and no longer practise it, which would be the result of such instructions for the fight, we lose confidence in it, and get out of the way of carrying it out, in fact we shall no longer be able to do so. The practices of our attacks on the parade ground are therefore not so unnatural as the advocates of the newest ideas seem to think. The attack is of course preceded in reality by a fire-fight of some duration. But we cannot represent this in peace time. The last part of an attack, the final rush, is carried out after a short pause, and the power of will, which must show itself in the behaviour of the corps (and let us add of every individual), is well expressed in the drill regulations.

So much for our opinions on the attack, with reference to the latest firearms.

We always presume that the enemy's artillery has been silenced, and that the remainder of our artillery, after the artillery duel has been fought, has been able to fire on the enemy's infantry.

The deployment previous to the advance only differs from the old method in that on a plain the distances between the different lines of battle have been increased. The use of the line was also formerly often necessary. It must be left to the tactical instinct of every leader, whether the line or column is to be employed.

To divide into half-companies or to advance in rank entire would soon produce evils similar to those which arose by the formations tried in 1872.

The maxim of immediate and sufficient deployment must be recognised. Nos. 22 and 23, Part II, of the drill regulations, give capital hints on this point, and Nos. 64, 65, 66, 68, Part II, further details. The independence of the different leaders down to the company commander, even to the *zug* leader (for the *zug* only is the fire-unit), must not be interfered with as regards tactical details. It is advantageous to at once tell off a party of direction, which will generally be in the centre of the first line. This party is shown a point of direction. This point should also, as far as possible, be shown to the other troops.

The first line must advance by rushes, without firing, when the long distances are reached. The distances have become greater, and the efforts to be made grow in the same proportion. Therefore when such an attack is now carried out, the men must as a rule take off their knapsacks.

If it is possible at all to make an enveloping movement, the troops told off for this duty should be directed on the point they are to march on from a good long way off. If they can reach a point to one side of the enemy, from where they can really to a certain extent outflank him, then this is one of the few exceptions, which in the attack permit of firing at longer distances than 600 metres. The troops told off for the frontal attack—we suppose they are on a level plain—advance up to 600 metres before they open fire.

The further advance is carried out by mutual support by fire. The weak points of this fire by the portions in rear are well known, and are particularly marked at the short distances. Can anything better be substituted? We answer, For the present, no. We believe that it would be better for the whole firing line to advance together with a rush for the last few times. To direct the fire to one side, when the fight has once commenced in front, we hold to be as a rule impracticable. Too much must not be demanded from human nature.

The insertion of troops will often be necessary at this stage of the attack. Without these reinforcements, which approach at a run, a further driving onwards of the firing line will often be impossible.

Generally speaking, the maxims which the drill regulations give in No. 82, Part II, are also applicable in the case of small-bore rifles. With regard to the execution of practices, we believe that we should lay stress on the fact that cohesion and

steadiness in execution cannot be let slide, especially on the parade ground. But unity of action is always the point to be remembered. We should deviate too far, if we were to fully consider this large subject here, but we will permit ourselves to make a few remarks on the tactical leading of infantry.

It will be possible to maintain unity in the field only in rare cases, even with the most careful leading. But this does not relieve us of the obligation to try and preserve it. It cannot be produced for the greater part by mechanical means, which was formerly done on the parade ground, but it must be the result of clear orders and the independence of inferior commanders.

About ten years ago a great deal was written on the subject of independence. We will give our opinion here that independence of action must always be judged of by a given case. There will never be any rule about the matter, and the order given will always count as the most important directing factor.

The art of combining unity of action in war with the necessary "self-activity" (we substitute this word purposely for independence) on the part of the inferior leaders is our most difficult task in peace and war. When a body of troops is attacking over a plain, self-activity will find comparatively the least scope.

In exercises on the parade ground situations may be produced which permit of self-activity, otherwise such an exercise is a school of regularity. Intentional irregularities have, as already remarked, no object whatever.

New regulations, be they ever so excellent, sometimes produce temporary defects, as some of these regulations will always be wrongly read.

So for instance the method of commanding, as required by the new mode of fighting, is often not yet properly understood, and thus often betrays uncertainty. One leader cannot yet quite shake off the old customs, and interferes too much; another thinks, that when he has given his first order or directions to his sub-leaders, any further interference on his part would have a bad effect. Long instructions for the sub-leaders, in situations where merely the direction should be pointed out to the foremost detachment, are fatal. Often, however, we see attacks, which in no wise deserve the name of a "planned attack," which the drill regulations demand.

Faulty commanding gives rise to wrong directions of attack, wrongly applied self-activity gives rise to separate and scattered attacks.

Now we do not doubt that the higher leaders and sub-leaders of our army will in the end rightly comprehend their duties, but

it seems desirable that the rules, which it is possible to give them for carrying out an attack on a plain, should be given to them.

We fully recognize, appreciate, and understand the intention of the drill regulations in leaving great scope as to how the attack should be carried out. But we think the question worth considering, whether somewhat more precise rules would not be advantageous for the average leader. The formation must be an elastic one, but it must exist. The intelligence of our officers will generally best understand how to apply this formation rightly to varying circumstances.

An ever varying formation in the simplest cases does not successfully train the lowest and youngest leaders, in whom the development of military ideas is only just beginning.

One scheme does no harm, only several schemes do harm.

We purposely refrain from giving a few rules here for the last stage of the attack, *i.e.* the final rush, although we have a vivid picture of it in our mind, and only point out the following :—

Through the introduction of the newest rifles the dangerous space is increased to about 600 metres from the muzzle of the rifle. To begin the final rush at 600 metres from the enemy's position is impossible. It would be a physical impossibility. In open country, however, and we are only considering this case here, there will be no certainty of being able to bring up troops by rushes beyond 400 to 350 metres. Magazine fire must now be resorted to, and the final rush carried out, aided by the support, which must either open out and mix with the firing line, or remain in closed bodies.

How shall this final rush be carried out? Even if the kit is taken off, this distance cannot be covered at a run. There is nothing for it therefore, but to begin with the storm—step (*sturmschritt*), and perhaps at 100 metres from the enemy to break into a run. But to cover the distance to that point simply in quick time without firing, is to ask for far too much, even opposite an enemy who is much shaken; and the movement would be likely to fail. It is necessary to somewhat subdue the enemy's fire. This is only possible by fire when in movement. The regulations allow this only in exceptional cases. But the fire-effect of men in movement at short distances will be now greater on account of the very flat trajectory. Shooting quickly and without a rest is also greatly facilitated by the light weight of the new rifle. When the men are at a run there can of course be no firing. The mode of advancing, the energy and untiringness must be observed in such a way as pointed out by the drill regulations No. 82, Part II; and this will be possible if this mode of carrying out the

attack is thoroughly practised. Every further halt after the magazine fire has once commenced (and proposals for such halts have often been made) means failure of the attack.

Before the storming of the position commences, the leader of a battalion, a regiment, in fact of any unit which is storming, must take post with the firing line. He orders the advance of the last reserves by alternate rushes, and gives the signal for independent firing, for the advance, and for the final rush.

This, in our opinion, facilitates the storming, and gives it a cohesive character.

About the defensive we have only to say that fire can be opened at greater distances, owing to improvement of the arms; but here also the greatest economy in the use of ammunition is advisable.

We should like to see greater importance attached to the counter-attack as a manifestation of the firm intention not to retire from the position.

If the fight of the present time is justly called a very dissolving one, we must try the more to let the troops enter the fight in their original order as unmixed as possible.

One reason why control is lost is very often that the advanced guard is too strong, which once having entered the fight, compromises itself in one way or another, and influences the resolutions of the highest leader.

The advanced guard should as a rule be strong in cavalry, weak in infantry, and moderately strong in artillery. Cavalry can more easily escape from a very superior enemy, and its defeat does not act decisively. If the infantry is strong and gets engaged in a stubborn fight, it must be supported to avoid serious disadvantages. A direction must then be adhered to, which may be recognized as very disadvantageous. A weak detachment of infantry can be more easily recalled, or even be sacrificed if necessary.

The leader of the whole force must take into consideration the *terrain* he has to pass through. If an important point is to be reached quickly, the advanced guard can be formed accordingly. Anyhow we should not like to recommend strong advanced guards as a principle.

They are especially superfluous if, as at Gravelotte and Königgrätz, troops are marching across country, knowing that collision with the enemy is imminent. Some cavalry and the divisional leaders in front are then the best advanced guard.

The 11th division, which on July 3rd 1866 had to make a march of two miles only, had its cavalry and one battalion only in the advanced guard.

The drill regulations and field service regulations point out that the leader should be in front at the beginning of the fight; and it is advisable that he should be with a line in rear during the fight, or anyhow at a point from where he can supervise the whole as much as possible, and which is otherwise advantageously situated.

Smokeless powder, the advantages and disadvantages of which have also been a good deal discussed of late, makes the leading easier on the one hand and more difficult on the other. Smoke now does not prevent aiming, but it also no longer marks the adversary's position. No lines of smoke show the leader how the battle is going from far off. The bullets are heard as they strike, but it is not known from where they are coming. The better must be the glasses of the higher leaders and their reconnaissance arrangements. Orderly officers, accompanied by mounted orderlies, should be present near the troops fighting to take messages to the rear. Many a decision, particularly about the disposition of reserves, will have to be arrived at later than in former times. The mode of fighting and the effect of artillery and infantry cannot be greatly influenced by it. The cavalry alone seems to us to have lost in its effect; its reconnaissance duties have undoubtedly become more difficult. The effect of infantry fire against cavalry attacks is not diminished by the absence of smoke.

Let us sum up our remarks about the infantry:—

1. The magazine rifle, smokeless powder, and also the improvements in artillery do not radically alter the mode of fighting.

2. Increased distances are necessary in battle formations.

3. We consider that a few more rules are desirable for the attack on a plain, to avoid dispersion and for the sake of strict training.

4. Most careful training of the soldier, not only in ordinary practices, but in martial spirit, to be impressed on him by the best example of all superiors, above all by those who come immediately in contact with him. The most just treatment is above all necessary here.

6. Simplicity of practices and upholding the greatest Old Prussian discipline.

7. Practising and getting accustomed to the disorder of the battle by purposely mixing up the firing lines of different units as an elementary practice, but at manœuvres only when the situation demands it, as in reality.

Good infantry must have many qualifications, and it must maintain them. Only this gives it true value. And if fire undoubtedly as a rule brings about the chief decision, still infantry will always be able to show in the ever changing tumult of the

battle, that an attack with the bayonet at the right moment and by surprise must not be cast aside as a means of fighting. Neglect of this might revenge itself greatly in face of a resolute enemy.



*List of Members who joined between 1st January
and 17th March, 1893.*

Rank.	Name.	Corps or Department.
Lieutenant ...	Boddam, E. B. C. ...	5th Goorkhas.
Lieutenant ...	Burlton, P. ...	Punjab Commission.
2nd Lieutenant ...	Campbell, G. D. ...	2nd Welsh Regiment.
Lieutenant ...	Campbell, G. P. ...	25th Punjab Infantry.
Lieutenant ...	Day, A. G. Fitz R. ...	2nd Welsh Regiment.
Captain ...	Francis, J. C. ...	D. A. A. G. for Musketry
Lieutenant ...	Fraser, N. G. ...	4th Bombay Cavalry.
Lieutenant ...	Gordon, Lincoln ...	N. W. Ry. Volrs.
Lieut. Colonel ...	Gunter, H. ...	Norfolk Regiment.
Lieutenant ...	Hawkes, L. H. ...	2nd Welsh Regiment.
Major ...	Ingram, E. R. B. ...	Do.
Lieutenant ...	Leonard, A. W. ...	Burma Military Police.
Lieutenant ...	McNeile, D. H. ...	R. A.
Lieutenant ...	Nethersole, A. R. ...	27th Madras Infantry.
Captain ...	Piers, W. B. ...	10th Bombay Infantry.
Lieutenant ...	Poulter, C. Mc C. ...	20th Madras Infantry.
Captain ...	Rideout, F. C. W. ...	Commissariat-Transport.
Staff Lieutenant...	Robertson, W. R. ...	Attaché I. B. Q. M. G's. Department.
Captain ...	Scallon, R. ...	23rd Bombay Infantry.
Lieutenant ...	Shore, O. B. S. F. ...	18th Bengal Lancers.
Lieutenant ...	Swayne, E. J. E. ...	18th Bengal Infantry.
Captain ...	Wood, E. P. ...	20th Madras Infantry.

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THE MODERN LITERATURE OF CAVALRY TACTICS.

By Lieut.-Colonel P. NEVILLE, 14th Bengal Lancers.

As regards the French and German views regarding attack formations, the two systems may be described thus:—The German tactics are to have a very long and strong first line with succour squadrons disposed in its rear, and an insignificant reserve; while the French prefer a deep echelon formation which seeks to turn the first blow, and then destroy the enemy's long line by a succession of vigorous blows delivered by fresh bodies of troops coming up into the fight in good order and cohesion, retaining the last reserve. It will be seen, however, that the recognised German authority on cavalry tactics (Major von Hönig) would like to see the regulations of his country modified. I will give his opinions in his own words. In the following *précis* I have only selected passages referring to the attack, and omitted many interesting and instructive passages regarding armament, organisation, &c. As the Germans were the victors in the last war with their great rivals, I will commence with their ideas.

THE GERMAN SIDE.

Ueber die Bewaffnung, Ausbildung, Organisation, und Verwendung der Reiterei, 1883.—This treatise caused a great sensation in European military circles. It is properly out of bounds here, as it does not directly treat of the tactics of lines, but at the same time, as it is the first of the series I quote, I put it first, and give a few paragraphs which seem to me important. The author advocates increased attention to fire action for cavalry, and better instruction in fighting on foot. "In the face of the infantry long-range rifle all carbines are insufficient; the cavalry must be armed with a weapon equal to that of the infantry in range and precision." He looks upon Oliver Cromwell as the father of cavalry tactics, and calls him "the greatest general of England—the first soldier in the world." . . . "The war of 1870-71 furnishes examples which go to prove that cavalry can still obtain great results in battle. Nevertheless, none of the modern wars furnish the proof that it may

still decide the fortunes of the day, as in the time of Cromwell and Frederick. . . Cavalry should be frequently exercised in battle tactics—that is to say, in the attack in three lines. It little matters whether, in the battle of armies, the cavalry acts against the enemy's infantry or his cavalry. Its action is not modified, and the side that knows best how to employ it will most easily disperse the hostile cavalry."

The next pamphlet by the same author is, "*Die Kavallerie Division als Schlachten*,"—Kärper 1885."

Reviewing the tactics of Napoleon and Frederick the Great, he says:—"The instrument used by Napoleon in his battles was not at all the same as that of Frederick. The former had freed himself from the shackles of routine of any kind. The inexhaustible resources of his brain enabled him to improvise the tactics of each individual battle. He admitted no general rule, and it is inexact to pretend that he had a preference for any special form of attack, as people often try to make out *à propos* of his tendency to pierce the enemy. On the other hand, they go too far who maintain that, from the dispositions of Frederick's battles, his cavalry tactics were simply a matter of routine. Frederick the Great himself recognised the superiority of a formation in two lines, the second outflanking on either hand, and without wishing to present here a study of the cavalry regulations, I may add that many thoughtful officers of to-day consider this formation as lending itself best to manœuvring *before, during, and after* the attack proper." . . . In considering the question of whether there exists a normal formation of battle for the cavalry division, he says:—"Cavalry should employ different dispositions according to the arm to which it is opposed. It fights against cavalry by grouping its forces in the most varied manner; against artillery, it will with advantage employ extended line, and echelons against infantry. . . . The action of cavalry being naturally first directed against that of the enemy, it must consider the attack of this arm its first consideration. By this we shall enter the path of success, if we commence by instructing our division as a manœuvring body, so as to educate the line commanders and bring our evolutions to perfection of rapidity and regularity. . . . Cavalry should acquire a complete mastery of the following formations, and learn to charge in them. (1) Double echelon of lines; (2) column of lines; (3) half-column of lines; (4) first and second lines in echelon, the third following the first; (5) first and second lines in column, the third in echelon on a flank; (6) two brigades in line, the third echeloned on a flank. When the division shall have learnt to preserve the direction and distances, when it knows how to form in order of battle without hesitation, whether by a change of front or a deployment; when it shall arrive on the new alignment compactly, ready to engage immediately in the attack, and rally promptly after the charge, then only will it be ready as a fighting body to take the last step. This consists in the transformation of exercise into manœuvre, and the means to arrive there is supplied by an *adversary*. . . . We shall no longer then cramp ourselves by a normal formation, but we shall learn to improvise the best formation for each different situation. . . . If the German cavalry is exercised in this

manner, if every two years we make it renew its apprenticeship as a corps and independent cavalry, it will acquire considerable importance in a tactical point of view." . . . Comparing the inaction of the Austrian cavalry on the 3rd of July 1886 with its happy dash at Custozza, he says:—"One sees from this of what importance to cavalry is the quality of its leaders, and how very essential it is for that arm, instead of being systematically grouped behind the centre and wings of an army, to be massed on the tactical point." Discussing the chances of cavalry against infantry on a modern battle-field, he shows that there is an epoch towards the close of every battle when infantry are completely worn out, physically and morally—by fatigue, hunger and thirst, the loss of their officers, the inevitable confusion and mingling of elements, by fear, wounds, &c. Especially at the decisive points, the line of battle becomes an amalgamation of bodies of troops of all sorts, their officers killed, themselves exhausted to the last degree, but struggling on doggedly still in their sanguinary task." "*At such a moment it is indifferent whether such a crowd is armed with repeaters, flint-locks, or pitch-forks.* Here is the opportunity for cavalry! No doubt the favourable moment is not eternal. At the end of a few minutes the struggling mass is beyond the dangerous zone, it takes breath, revives, recovers a certain amount of vigour, and the deadly arm regains its murderous power. If the cavalry leaves these few minutes to the enemy, it deserves to be driven with ignominy from the battle-field."

"*Tactische Directiven für die Formation und Führung der Kavallerie Division.*" 1885.

This work, by the same author, formed the basis of the German cavalry regulations of 1886.

Of the divisional commander, he says:—"Time, space, and the point in the line of battle threatened by the attempts of the enemy, are not the only factors to be considered in deciding how one may best engage a division of cavalry. It is equally necessary to weigh the other circumstances which offer a tactical interest, and finally to adopt a resolution which shall be in accordance with the result of such an examination. This was the procedure of Seydlitz at Rossbach, and thus it was that Pultz intended to act at Custozza. It is precisely, however, the precipitation with which the latter acted, which caused the result to be a doubtful victory. If he had calculated better the time at his disposal, if he had not wished, so to speak, to seize the occasion by the horns, if he had first of all made sure of unity of action throughout his command (which he might have done, seeing that he required less time than his adversary to deploy), it is probable that Colonel Pultz would have won one of the grandest cavalry victories of all history . . . For a tactician, who sees exactly what the enemy is doing, as a turning movement (Rossbach), or a direct attack (Vionville), or a simple passage from column of route to battle formation, there can be no possible hesitation. His counter-measures will consist, not in clever manœuvres, but in simple movements, which will bring him against that point of the enemy's force which he means to attack, before the latter is ready to receive or parry the blow, and which will permit him to develope at the decisive

moment the total force of his squadrons. This, however, supposes that the commander sees correctly and in good time what is going on from some point of vantage which discovers the ground afar, as Seydlitz at Rossbach, Pultz at Custozza, and Bredow at Vionville. This condition being wanting, the most perfect formations and most rapid evolutions are powerless to remedy a situation which reveals itself too late. To seek to make up for lost time by acceleration of movement will most frequently result in a defeat. Under such circumstances pace is apt to assume a precipitancy beyond the means of the best cavalry."

"The excitement of the chief communicates itself to his troops; unforeseen accidents will cause the falling of horses, and spread disorder; moreover, by reason of their inequality of pace, the horses will disperse, movements are made without order or cohesion, distances are prolonged, direction is lost, and in this state of dislocation, the division passes to the battle formation and essays to employ a maximum of force. It requires no prophet to foretell the result. Notwithstanding, it is in this manner, and even worse, that cavalry has been led!"

After a chapter on the training of the brigade, the principles advocated being very similar to those already described for the division, the author goes on to say:—"The brigades, being thus prepared, it will be seen the day they join the division, that but little further training is necessary to enable them to arrive at their final perfection of fighting instruction, *the charge in two or three lines*, conducted in such a manner that the enemy may be *outflanked*." . . . He lays great stress on the urgent necessity for practising the passage of defiles. "It is evident that if in front of the defile there is no room to deploy, nor a favourable field for action, it is better not to attempt it. But occasions will often occur when as considerable a body of cavalry as a division will be obliged in the course of an offensive movement to pass from extended formation to column and *vice versa*. (As at Königgrätz, Tobitschau, Mars-la-Tour.) This being the case, who will venture to contest the importance of being exercised in operations of this nature, as well as the units of which it is composed? It will rarely happen in the actual conditions of war, that a division of cavalry can preserve the formation of combat from the moment it is set in motion until the actual attack. It matters little whether it marches in two or three lines; a certain extent of front is indispensable, and this front will frequently be wanting. However, if the presence in his front of one or two defiles were sufficient to deter a cavalry leader from some useful enterprise, what confidence would he merit? . . . In opposition to prevalent ideas on the subject, I attribute to the passage of defiles such an importance, that I should like to see no day pass during manœuvres in which the division did not practise this. For example—will it not often happen that the whole, or a part, of the second line, according as it outflanks the first, or one, or both wings, will find itself confronted by obstacles which neither the division nor line commanders had foreseen, and which it is impossible for it to pass in extended formation? Obligated to diminish its front, the second line will lose, to a greater or less extent, its distance, and if the first line is not careful, it will not intervene except out of breath and

by successive fractions. Certainly the original disposition will be broken. If the action of the Prussian regiments was so straggling at Königgrätz, it was not alone the fault of the leaders, but also because there had been a want of practice in the passage of defiles." Discussing the point of whether there should be two or three brigades in a division, he says :—"The organisation of a body of troops should be appropriate to its nature and destination. In subordination to the exigencies of tactics, it should furnish the means for attaining its ends. Well, notwithstanding the uncertainty which has pervaded the subject, there is no possible doubt about the fact that the main power of cavalry should rest in the front line. It follows then, that this line should possess a greater force than either of the other lines, and at least as much as the other two together. On the other hand, the necessity for having, in the majority of cases, three lines, was a recognized thing. It was thought necessary to respect a principle consecrated by military history. . . . The best combination appeared to be a division of two brigades of two regiments each. This was not adopted. They decided on three brigades of two regiments each, under the pretence that this solution had strategic advantages. This was merely a possibility ; they have made it into an axiom. Well, the axiom is false. In the simple point of view of facility of command, the division chief should prefer two brigades to three." Of lines, he says :—"Great tactical bodies ought of necessity to be echeloned in depth. This disposition gives suppleness to the mass, assures a distribution of the troops, which allows of completing a success or parrying a repulse, and which guarantees the economy of the forces. In any movement of great extent of front, cavalry cannot do without an echelon formation. On this point there never been has been any divergency of opinion. Where the discord comes in is in the application of this fundamental principle, that is to say, in the determination of the preparatory formation to employ. Although the chief should enjoy a complete liberty in the choice of means to be taken to attain the tactical end assigned him, it remains no less necessary that some fighting formation should be rendered specially familiar to the division, to serve as a guide to its operations on the field of battle. This typical formation they made rather a question of the number of brigades than of the number of lines ; notwithstanding, it was impossible, with reference to this latter, to avoid discussing the composition and positions of the second and third lines. To be practical, the tactical formation of the division should be in all its parts in harmony with its organic constitution. The formation in three lines responds to this condition ; it remains to be seen, if by assigning to each line and each brigade invariably eight squadrons, they have given them a judicious composition. In the drill committee of 1876, they did not agree, either on the number of lines or brigades. Some were for three, others for two. General v. Schmidt turned the scale in favour of three brigades, and from this has resulted the cardinal error that "lines" and "brigades" came to be looked on as identical things. . . . The root of the cavalry tactics of Frederick consisted in hurling at the enemy a first line as strong as possible and according

to the King's own intinction, with such impetuosity that the enemy's first and second lines should be driven back by the shock. The second line had but relatively a secondary importance. . . . The Great King had no wish to impose on his generals a hard-and-fast rule. He wished merely to indicate the desired end, and leave to them the choice of means for carrying it out. In principle, they used to form two lines, one out-flanking the other. The first was the line of attack, the shock of which should be decisive; the second, the line of support, whether to complete a success, or to show front to the enemy's flank attacks. The number of lines and the distances between them varied under Frederick according to circumstances. It will be the same under any other cavalry general when the instruction of tactical bodies has arrived at such a degree of perfection, that no fears are to be entertained as to the correct performance of the required movement. The talent of the general—his genius, as we are in the habit of saying—is not the only factor to be considered. The most perfect genius would be incomplete, if the means of action—i.e., the instruction of the troops—be defective There are no longer to be found in central Europe battlefields on which 30 or 40 squadrons can advance in a single line, be that line as wavy as it has always in reality been. The different sorts of cultivation which cover the soil impose a restricted front. How shall we decide on its extent? Speculation is still rife on the subject. We require, then, chiefs knowing how to lead to the attack a line of two regiments or more, with subordinates capable of acquitting themselves in a satisfactory manner in the part that falls to their share in an operation of this kind. It must be noted that, even under Seydlitz, a front of this extent has never formed a mathematical straight line, and that there have at all times been projections and recesses, recalling more or less our formation of echelons."

Speaking of the great difficulties which the divisional general has to contend against in a modern battle, the author says:—"Imagine the situation of the cavalry divisional commander! He sees that in one of the enemy's wings a great mass of cavalry is commencing offensive movement. He cannot yet distinguish, even by the aid of glasses, if it be a whole division or a lesser body. It little matters, he intends to attack at all risks. He therefore puts his force in motion, himself in front, with his first and second line commanders. You may see them come and go, binoculars in hand. In the meanwhile, the enemy discovers what is passing in front of him. He manœuvres in his turn. His cavalry is enveloped in a thick cloud of dust, with here and there a flash of arms. Judging from the disposition of the clouds of dust, one may approximate the formation of the lines, but not their force. Each of the adversaries desires to make sure of the initiative; it follows that the intervening space disappears in the twinkling of an eye, and that both sides fall on one another so suddenly that both are surprised. . . . It is an easy matter to change front or alter direction, even of the first line, as long as it is in squadron columns; the more so since it is not, as a rule, necessary to change front a quarter or a third of a circle, but at the outside, a sixth or an eighth; but once the deployment is effected,

there is an end of changes of direction,—the charge is delivered straight to the front. Happy then, the side that has the numerical superiority, and throws his line on the enemy with the greatest vigour and cohesion. Theirs will be the victory, if sustained and supported by the second line. The deduction is, to weigh everything when in squadron columns, to dare everything after the deployment, then charge. There is no other method." The difficulty, he thinks, from the point of view of manœuvre, of constituting an overwhelming first line, may be overcome by adopting a division of two brigades of three regiments each. The division would still remain of six regiments; there would be one brigadier the less, and nothing would prevent the formation of two or three lines at pleasure, keeping twelve squadrons in the first line, and the remaining twelve either in one line or two. "With our division of three brigades of eight squadrons, we are always obliged to break up a brigade, when we desire a first line of twelve squadrons. (Which will be, as we have seen, the usual case.) There is nothing to prevent the second line being a complete brigade of eight squadrons and the reserve a single regiment."

Of the second line, he says:—"In place of—*As a general rule the first and second lines should not cover one another*—(quoting from the German cavalry regulations), I would prefer the rendering—'*After the deployment, the first and second lines should never cover.*'" . . . Even against infantry, the author is averse to charges of successive lines. The killed and wounded horses of the first line would certainly cause such confusion in those succeeding, that in them no cohesion could possibly be maintained. As for the protection of the first by the second line, it consists, he says, in guaranteeing it against parties of the enemy's cavalry who may attempt to take it in flank. The fear of flank attacks is, he thinks, made too much of a bogey. "The fear of a flank attack weighs, as a rule, like a curse on cavalry. How many flank attacks, though, have ever been crowned with success? If the enemy's first line, and part of his second, have been overthrown by our first line, it appears difficult to believe that the intervention of a hostile squadron on a flank will have power to alter the situation, the more so since it will be obliged to offer its own flank to our second line. In all sincerity and truth, I affirm—the history of war in hand—that flank attacks have been rare in the past, and that they will be equally so in the future, because their execution is, and will remain, difficult." . . . "The flanks of the first line will find their security in the *coup d'œil* of the leaders, and in the manner in which they combine and understand one another. The second line commander should keep close to the divisional commander, or at least he should not lose sight of him, to the end that he may be at all times acquainted with what is passing in front, and may be thereby enabled to give the necessary orders in good time; either by signs, or signals, he will indicate to his line the points on which it should throw itself. . . . This is the way to recognise on which flank is the danger, and to determine, in consequence, the manner of employing the second line. The protection afforded by this line will take, then, the character of a support, and will be exerted in the form of an attack which will not, as a rule, be very oblique to the direction of the first line. . . . If

the whole of the enemy's first line has been overthrown, the second line can do is to attack on a front parallel to the first line. It will be a mistake to make it execute an oblique attack, as this would only expose its own flank to the enemy's second line.

Of the third line, he writes, that while infantry should be in a fighting formation of gradually increasing units, cavalry should be in the reverse. The first line should be the strongest and the second should gradually decrease in strength. "A commander should never let his third line get out of hand during the combat. He should weigh what he has to gain in case of a success, and what he has to fear in case of a reverse. He should regulate the disposition of his troops in consequence. The existence of a reserve is a measure of tactical provision, but it must be understood that it is never to be touched. A reserve not touched does not come short of its object. . . . Each cavalry commander of a division, unit, be it division, brigade, or regiment, will always keep a reserve in hand, not with the intention of appearing weaker than he is, but with the end that he may throw this reserve on the critical point of the action. . . . According to the end that he may throw this reserve on the critical point of the action, the third line is not understood to be a line of battle; it is a reserve in the disposal of the divisional commander. Well, what is the effect of a reserve which has the effect of enfeebling tactically and the first line, to the point of reducing it to impotence? and a great part of the force without the possibility (by reason of its position) of taking part in the action case where it has any wish to do so?" . . . That the first attack on occasion in an echelon formation, is a point he never touches.

"Before everything our cavalry ought to return to the attack on a broad and continuous front. Frederick—the attack on a broad and continuous front. . . . at all exclude the employment of a line in echelon, provided the steps of the echelon follow each other quite close—not more than fifteen seconds—and that they preserve exactly their cohesion. . . . little matters whether each degree of the echelon is composed of a company or a brigade: the essential is that the attacking line should preserve cohesion, and that its axis should pass through the centre of the echelon. . . . Keeping this well in view, a moderate echelon of the echelon presents even real advantages."

Of lines in general, he sums up thus:—"It is certainly impossible to arrive at a good result in disposing on one flank the second line, and on the other the third. Nevertheless, the tactical flank (most frequently unknown at first) reveals itself only during the course of the attack, there is place for a normal formation in which the second line outflanks the first on both sides, and he should make use of this only in case the country is very close, or the view obstructed by fog or smoke, or only in an open plain, and in presence of a clearly defined tactical flank that one would be justified in placing the whole of the second line on one flank."

Of succour squadrons, a formation he condemns, he writes, "The formations of depth are to the prejudice of rapidity. . . . The

is advisable to take for our rule this truth, confirmed by the history of cavalry;—a strong first line, short distances, a number of echelons as small as possible. If with this one is unsuccessful—supposing the tactical action be well conducted—it is that success was not possible. . . According to the regulations, the succour squadrons have to prolong the first line, fill up gaps, and cover the flanks. This is to expect too much from the tactics of lines. The division, complex in its organism, should be simple in its formations. . . To prolong is not difficult, provided the succour squadrons are placed behind and beyond the wings, at a distance of thirty paces and no more. Without this proviso, they will certainly arrive too late. To execute or repel a flank attack, these squadrons are too weak. And to fill gaps! To fill a gap, one must know where it is, and who will divine or tell them this? No, the legs and lungs of our horses are not equal to the task. . . It is the second line which should execute and repel flank attacks, prolong the wings, and fill up gaps. This rôle will not be beyond its forces, for it will presumably not be necessary to satisfy all these demands at the same time. At all events, if that happened, we should be justified in saying that the divisional general and the first line commander were not in their proper places. When cavalry is reduced to trusting in its succour squadrons, to repair losses inflicted by infantry or artillery fire, it has nothing left to do but commend itself to the protection of Heaven. It will be irretrievably defeated if it does not at once beat a retreat. If one waits until this retreat is imposed by circumstances, it will be executed in a disorder so great that it is difficult to imagine. The men, no longer knowing front from rear, will disperse in all directions in wild disorder, deaf to appeals and refractory to the most desperate attempts to rally them. . . . It is a tactical principle that from the moment it assumes fighting formation, every line should have its rear clear. . . Suppose a misfortune to the first line—say a volley of shrapnel which in a moment empties twenty or thirty per cent. of saddles—which is not at all impossible—it is ten to one that the line will go about, upset everything behind it, and in a few moments throw the whole mass into a state of confusion which will render it useless. This consideration, and others that I leave to my readers to judge the value of, show with what circumspection one should approach the objective of attack, and how important it is, once one is sure of the power to seize it, to charge to the front in the simplest possible formation. Away then with our succour squadrons, and our lines of equal strength, and our exaggerated distances! In place of four lines, none of which is in reality capable of striking a decisive blow, it would be infinitely better to have only three, and perhaps, even no more than two.”

This concludes the *précis* of the German side.

It will be seen that the German writer does not approve of the regulations in force in that country, which he would like to see modified. He would do away with succour squadrons altogether, cut down the exaggerated first line to twelve squadrons, place a regiment (whenever such a disposition appears desirable) on either flank in support, and keep one regiment in reserve, while closing up all the distances.

I will now give extracts from the writings of the great French authority A. A. (Aubier).

La Cavalerie dans la guerre moderne, par A. A. (*Reveu des Deux Mondes*, 1890).—In the translation of this paper by Colonel C. W. Bowdler Bell, there is the following preface note by Lieutenant-General H. Brackenbury:—"These interesting articles are believed to have been written with the approval of General Gallifet, and to express his views on the subject of cavalry in modern war."

The author begins at the root of the whole matter from his point of view:—"At all times cavalry has fought in echelons or lines, that is, by a succession of rapid but regular acts. This is the very sense of the tactics of such men as Frederick and Napoleon. 'We must not forget,' wrote the latter, 'that cavalry is more or less in four or five lines, and that the rear lines, if they are not turned by the opposing cavalry, may take it in rear.' Murat, Lasalle, Montbrun, Kellerman, always worked on this principle, as Ziethen and Seydlitz have done, and owed their principal successes to it, as it made the handling of masses possible. In military language, a 'line' is not a geometrical straight line: it is a particular group, whatever may be its tactical formation. Distribution in several lines, then, does not imply the idea of a series of single deployed lines, but rather a succession of forces disposed in echelons. . . . What experiments, what actual facts in war, justify the conclusion that extended fronts are necessary? While all military history shows that cavalry engagements, far from developing themselves in a continuous line, are nearly always fought in the direction of depth, by echelons, by a succession of groups hurled upon the common objective one after the other. Does any one believe that at Kollin and Rossbach, Ziethen and Seydlitz led, in the one case 65, and in the other 48, squadrons to the charge on a single front? At Prague, on the respective sides, 70 and 80 squadrons engaged; at Aspern and Eylau, Bessières and Murat charged at the head of 40 and 80 squadrons respectively; at Königgrätz two divisions of cavalry threw themselves on the victorious enemy. Does anyone believe that these masses of cavalry fought in one block, and on a single line? At all times the ground has presented obstacles, ditches, or banks; and yet at all times the victorious cavalry has worked in large masses. The ground is a factor common to both the adversaries, but the tactician will always know how to take advantage of it so as to compel, and not to submit to, the fight; and will only commit his troops to the extent actually required, and will always manage to have the last reserve. Herein lies the secret and the whole strength of the mechanism of lines. These characteristics of the fight, in conjunction with its instantaneity, require the rapid and constant co-operation of each line or echelon leader. . . . But cohesion, in order to be complete, must be one of *morale* also. The same spirit of forward impulsion, of joint responsibility, of confidence, must animate all the parts of this vast body. As soon as the objective is perceived, all the parts, as by a magnetic understanding, must push forward to the attack. Their efforts, successive, but closely connected, must blend themselves into one common swoop. Such was the charac-

teristic of those marvellous squadrons of the Grand Army, trained to such a degree, and so animated by the spirit of the offensive, that they could not see rival cavalry without attacking it."

Du Rôle stratégique et tactique de la Cavalerie, par A. Aubier, 1892.—We are passing, says the author, through a transition. "Nous sommes à une époque de transition et de progrès ; nous en attendons les bénéfices, mais nous en subissons les inconvénients."

He deprecates any sort of preparatory formation :—"En réalité le combat de cavalerie ne peut aboutir à une formule, à un dispositif." . . . "Place a mass of cavalry on a level plain, with neither woods nor rivers, valleys nor hills, with an imaginary enemy in a vague direction somewhere ahead : it will assume a preparatory formation. Place this same mass of cavalry on a real ground in front of a living enemy : it will take variable disposition according to the enemy and the nature of the ground. Or, à la guerre, il n'y a pas de situations générales, il y a des situations particulières, positives." However, he admits that when in the proximity of an enemy, the best disposition is three brigades of equal strength in a double echelon from the centre ; but he says, "il est clair que la plupart du temps des circonstances spéciales viendront substituer à cet échelonnement conventionnel des dispositions logiques et appropriées." He believes that in the near future the increasing tendency to concentration, which should be the base of all tactical conceptions, will result in the absolute suppression of the preparatory formation, and the passage at once from the formation of approach to that of combat. He finds that the preparatory formation prejudices the issue of the fight by engaging irremediably the attack in the primitive formation ; that the placing of the second line on a particular flank, not imposed by the conformation of the ground when the menaced flank is still a matter of conjecture, is to expose the brigade to charge the air. The future combats of cavalry divisions will eventuate as follows :—The three brigades march in Indian file, one behind the other (in line or columns of mass, according to the lie of the country), at 220 yards distance, the artillery 55 yards behind the first (or on the flank if the ground should demand it). In the most favourable cases the division may well be disposed in a triangle, the first line in line of masses, the other two in columns of masses, forming echelon at equal distance on each flank. Following the intentions of the commander, one of these brigades becomes the reserve ; *in any case they should only engage by echelons of regiments*. On the report being received of the advent to view of the enemy's main body, the general officer commanding gallops forward to within view of them. He observes, and then briefly despatches his orders to his brigadiers thus :—To General A, commanding the first line : 'Attack in such a direction.' To General B, commanding one of the flank brigades : 'Support the attack on such a flank.' 'Engage all your brigade,' or, 'only engage by echelons of regiments.' To General C : 'Form the reserve in such a direction.' To the Officer Commanding Royal Artillery : 'Take up your position at such a point.' That is all. The brigadiers gallop back to their places. The General waves his sword, the division deploys, and bounding forward, flings itself at the throat of the adversary."

The deployment should, he says, be instantaneous, direct from mass to line of battle, by successive echelons of all the units. This has the advantage of preserving the whole force up to the latest movement within view and hail of the general officer commanding. The line of squadron columns, he adds, is a dangerous transition formation, condemned to disappear. Between this and mass at elastic intervals—the only practical formation in a broken country—there is only a distinction of words. His next paragraph I give as it stands:—“*Chaque élément se déploie sur lui-même, formant échelon, et ne se porte en ligne ou à l'attaque qu'une fois formé. Cette règle s'applique non seulement aux brigades, mais encore aux régiments dans la brigade, aux escadrons dans le régiment. Dans ces déploiements on doit sacrifier la rapidité à l'ordre, à la cohésion. Dans le combat de cavalerie contre cavalerie, en effet, ce n'est pas la vitesse, c'est la compacité qui produit le plus grand effet moral: au contraire, dans le combat de cavalerie contre les autres armes, la rapidité doit l'emporter sur la cohésion.*” Remember, he says, the saying of Lasalle on seeing the enemy's squadrons starting off at full speed, “*Ces gens là sont perdus !*” He himself would attack at the trot, and not commence his gallop until the moment for charging had arrived. On the contrary he charged infantry at full speed. To-day the gallop has replaced the trot; it is a modern canon that good cavalry ought to be able to manœuvre at the gallop without the slightest disorder—but, at the gallop of manœuvre, not the extended gallop. As for the reserve brigade, it is very exactly a reservoir into which the general dips as he has need. A squadron, a wing, a regiment, which he throws successively into the *mêlée*. The rule is to preserve some one group as a point to rally on.

Of horse artillery the author says:—“The horse artillery attached to the division borrows from the cavalry the directing principles of its tactics,—*concentration in its employment, independence in its operations, rapidity in its execution.* The commander, put in possession of the general tactical idea of the divisional commander, should not wait for further instructions. He should sacrifice precision of fire to rapidity of entry into the fight, and aim rather at moral than at material effect. He should force the enemy's cavalry to manœuvre and deploy. His audacity should not be diminished by any fear of surprise or attack. The cavalry combat is so short, that in case of surprise he will be very promptly disengaged, if his side is victorious; if not, he can, with difficulty, escape the grip of the conqueror. This consideration ought to settle the question of escorts. Being powerless to protect the artillery by the sword, the escort should be simply a group of scouts.”

Of the German cavalry tactics, he says:—“Their main idea is the reinforcement of the front line, composed of two brigades, of which three regiments are deployed in one line, and the fourth disposed directly in rear as a support. The second and third lines, very much closed up, are composed each of a single regiment. The whole stake reposes on the first line, and with this sort of knock-me-down blow, the Germans think they will overthrow our system of echelons. It remained for a cavalry intoxicated by its recent traditions and animated by the purest

spirit of offence, to uphold this audacious tactical formation. The deployment of three regiments of five squadrons each, on a single line, is long and difficult; many grounds will not lend themselves to it, and, in short, it needs only a slight error of direction for the whole or part of the division to be wasted in the air. On the other hand, it does not appear that one augments the power of a mass of cavalry by disposing a greater number of elements in a single line. What does it matter, in effect, if these elements be on the same level, provided that they occupy the same frontage? A division of cavalry is not outflanked because its front line is shorter than the enemy's; it is sufficient if this line be supported in the rear by echelons deployed (and it ought so to be, since each of its elements should form successively on itself). It is not then *the general alignment of its elements* which constitutes the strength of a cavalry attack, but their judicious disposition, and in each of them order, compactness, *cohesion*. 'It is not,' says Napoleon, 'in the cavalry fight, its velocity alone that ensures success: it is its good order, and the proper employment of its reserves.' . . . "Well," sums up the author, "I believe that these Germans have lost sight of these principles, the last especially, in imagining their new formation. I hope above all things they may have occasion to prove its value."

La Tactique et les Règlements (being one of a series of letters by the same author in the *Reveu de Cavalerie* Magazine, August 1892).—This article criticises the German system of a long front line, and proposes a counter formation of superior mobility. The author begins by seeking the *raison d'être* of the German tactics. This he considers to be that they wished to simplify matters. "The greatest difficulty in the cavalry combat results evidently from its rapidity. All the phases of the classic battle are here condensed into an almost instantaneous collision, and while there, a general had several hours to observe, decide, and give orders, here a cavalry commander has to accomplish as much in a few minutes. *De là: la nécessité primordiale d'une simplification excessive.*" Now the regulations of 1876, both French and German, disposed the cavalry division in echelons of equal strength, outflanking one another, the threatened flank advanced and the other refused, a too complicated fighting machine. . . . Experience has proved that with this subtle division of the fight into three lines equal and distinct, with this play of combined intervention, a single echelon—the first—attacked, as a rule, under good conditions of direction and cohesion; the second line seldom succeeding in joining effectively in the success of the first line, the third line charging most often into empty space. In the very desire to link the converging efforts they destroyed the equilibrium of the entire mass, and clogged, instead of developing, the power of initiative of the line commanders. The Germans have evidently attempted to remedy these disadvantages by attaching to the first line more closely the whole of the second and part of the third, so as to make of the division a machine of two wheels, instead of one of three; a block for attack, a group for reserve. Once started, the action is simple, and the division commander has only to give the order to attack. But there is disproportion between these two masses; one comprises five-sixths of the total

force, the other one-sixth only. Moreover, the attacking itself on an excessive front. There is the tactical error. German conception there are two things: an *idea* of simple is in itself excellent; an *application* of this idea which is it leads to an exaggerated line or extension, out of all proportion manœuvring grounds, and above all, to the resources in division. There is a want of equilibrium between the space and the support (moral and material) of the reserve. It is that a line of three or four regiments deployed will often be suitable for its action. In any case it is certain that the of direction at the beginning will expose the greater part of to charge into empty space. And this error will occur from the fact that the great extent of frontage will necessitate deployment into line at a considerable distance, and in consequence the commander can be absolutely certain of his idea for as say the Germans, 'these squadrons can wheel round.' The round if they have time and chance: they will wheel round provided they are not caught in the act by the enemy's effort. The source of this error dates back to 1876. The expression is understood in too literal a sense, so that it came to be understood that each element of the division should have its proper field of action. Thus at the end of the manœuvre, the positions eventuated in a general line of five to six regiments front. We have seen at camps-of-exercise what this ideal results in. Directly the fight commences, the opposing forces, escaping from the hands of their chiefs, deploy mechanically to the normal disposition, and most frequently a part of the force is thrown into the air. The new German regulations, while simplifying tactics, have preserved and developed the principal fault. This is a lesson to be to us a lesson. . . . I believe we are on the right track at it (*i. e.*, the better application of the idea of simplification) we hold to the good principle—concentration; because we have the formations and reduced the distances; because, in a word, we have the point of substituting for *linear extension* the system of *depth*. These are the true tactics—the tactics of Napoleon. . . . He next discusses the numerical superiority of the Germans and their superior armament (the lance*), and then says:—"We now arrive at the delicate point and true controversy of the debate. Of two masses of cavalry, the one relying entirely on a line and abandoning all idea of manœuvre, which only attacks and throw all that is opposed to it; and the other distributing the force of the fight in three echelons of equal strength, which see first shock and then destroy the adversary by a succession of blows—which is right? It is a case of science against brute force. Both have their advantages and disadvantages. The one is here but if it fails in its first enterprise, it is without resources,

* All thoughtful cavalry students would do well to read this pamphlet—"Notes on Cavalry Literature, treating more especially of the lance," by Major G. H. Elliott, 3rd B. C. Pioneer Press, 1890.

of a well-advised enemy. The other is more complicated, and from this very fact it risks seeing all its machinery upset before it is able to combine its action. Could we not combine in a just measure a vigorous offensive with a prudent reserve? Yes: by separating the mass of the division into two well-defined parts. It is in this that the German simplification consists, the sole advantage of their new tactics. Only in the German division there is not really a separation of the two masses, one of attack, the other of reserve; there is in fact an absorption of the second by the first—an exaggerated shock line and an insignificant fraction for the reserve. It is a tactical error, borne out by experience, to build up a cavalry victory on the success of the first line, whatever may be its strength. Neither Frederick nor Napoleon have ever inculcated a like principle on their cavalry generals. At Kollin, Rossbach, Zorndorf, Prague, Ziethen and Seydlitz did not lead to the charge 50 and 80 squadrons in line. At Aspern and Eylau, Bessières and Murat certainly threw, the one 40 and the other 75, squadrons into the fight, but in a deep formation and by successive lines. Under the Great King every line of cavalry going into action, in default of natural protection afforded by the ground, had artificial supports of from five to ten squadrons of Dragoons or Hussars formed in column of troops ready to deploy in prolongation of the line of battle, or to form for offence or defence on the flanks by simple changes of front. In rear came, not a reserve, but several lines of reserves. This was at once simple and workmanlike. The same method was taught by Napoleon to his generals. 'The cavalry Generals Murat, LeClere, Lasalle,' he writes in his *Notes et Mélanges*, 'confronted the Mamelouks in several lines: when the latter were on the point of outflanking the first, the second came to its succour on the right and left. The Mamelouks then pulled up and converged to turn the wings of this new line. This was the moment chosen for charging them. They were always broken.'

"It may be objected that the Mamelouks were but irregular cavalry. True, but they were the best in the world, and only wanted fighting tactics. Elsewhere Napoleon insists on this point. 'One must not forget,' he writes in another note, 'that cavalry is more or less in four or five lines, and that the rear lines, if not turned by the opposing cavalry, can take them in rear.' The German model, then, is bad. We should oppose and not imitate it. Let us retain only its idea of simplicity, and the joining of the second to the first line to guard its flanks and afford it moral and material support. But do not let us make the two echelons into one rigid line. We should find all the disadvantages already mentioned of an exaggerated line."

In conclusion, he argues that the best formation for attacking the Germans is, the second line divided into two wings, one on either flank of the first. The first line can then attack with complete confidence, having a guard on either flank, while the reserve, keeping at first well out of the fight, is ready to throw successive echelons (their strength from a single squadron to a complete regiment, but never more) into the *mêlée* at whatever point their intervention appears necessary.

I have now concluded my extracts in support of the French side of the question. I now propose to compare the rival views and show where they agree, and where they differ. It is noticeable that neither writer is perfectly satisfied with existing regulations of their respective countries: so, as it is with the writers' views and not the drill-books we have to do, I shall disregard the latter, and only treat of the sentiments expressed in the extracts I have given.

To begin with the points on which both are agreed. The first of these is that a normal preparatory formation is bad and mischievous.

"We shall no longer then," says von Hœnig, "cramp ourselves by a normal formation, but we shall learn to improvise the best formation for each different situation." Says Aubier—"En réalité le combat de cavalerie ne peut aboutir à une formule, à une épreuve, à un dispositif. . . . Or, à la guerre, il n'y a pas de situations générales, il y a des situations particulières, positives." This writer believes that in the near future the increasing tendency to concentration which should be the base of all tactical conceptions, will result in the absolute suppression of the preparatory formation, and the passage at once from the formation of approach to that of combat. This formation of approach he shows to be the three brigades, marching one behind the other, in line of masses or column of masses, according to the lie of the country. In the most favourable cases, the first brigade in line of masses, the other two echeloned on the flanks in column of masses.

The next point on which there is a mutual agreement is that it would be better to divide the second line and put a regiment on either flank of the first line instead of, as at present, having the whole brigade on one flank, which may or may not (for the situation does not develop until the engagement has actually begun) be the right one. Says von Hœnig:—"It is certain that it is impossible to arrive at a good result in disposing on one flank the whole of the second line. . . . Nevertheless, given that the tactical flank (most frequently unknown at first) reveals itself as a rule only during the course of the attack, there is place for the adoption of a normal formation in which the second line outflanks the first on both sides."

So adverse is he, however, to any kind of normal formation that he adds:—"And we should make use of this only in cases where the country is very close, or the view obstructed by fog or smoke. It is only in an open plain, and in presence of a clearly defined situation, that one would be justified in placing the whole of the second line on one flank." On the other side Aubier says:—"The placing of the second line on a particular flank, not imposed by the conformation of the ground, when the menaced flank is still a matter of conjecture, is to expose the brigade to charge the air." He illustrates the subject by the procedure of the great generals, Murat, Leclerc, and Lasalle, who, when fighting against the Mamelouks who were acknowledged to be the finest cavalry in the world, invariably supported the first line *on both flanks*.

Now, these two points on which French and Germans are agreed, are of the most vital importance to us English, and for my part, I think

there can be little or no doubt about the soundness of the conclusions arrived at by both writers.

To pass to the disagreements—the rival authors seem to have taken very different views of the minds of the greatest of all cavalry generals, (I think that von Hœnig gives an undue importance to Oliver Cromwell), Napoleon and Frederick the Great. Von Hœnig says: “The root of the cavalry tactics of Frederick consisted in hurling at the enemy a first line as strong as possible.” Aubier, on the other hand, says:—“It is a tactical error, borne out by experience, to build up a cavalry victory on the success of the first line, whatever may be its strength. Neither Frederick nor Napoleon have ever inculcated a like principle on their generals.”

“He (Napoleon) admitted no general rule,” says the German, “and it is inexact to pretend that he had a preference for any special form of attack, as people often try to make out *à propos* of his tendency to pierce the enemy.” The French writer *ripostes* with the very words of the Emperor—“One must not forget that cavalry is more or less in *four or five lines*.”

Again—“Under the Great King, every line of cavalry going into action, in default of natural protection afforded by the ground, had artificial supports of from five to ten squadrons of Dragoons or Hussars, formed in columns of troops, ready to deploy in prolongation of the line of battle, or to form for offence or defence on the flanks, by simple changes of front. In rear came, not a reserve, but several lines of reserves.” Now, it is certain that Frederick the Great *did* formulate the principle that the first line should charge with such impetuosity, that the enemy's first line, and part of his second, should be overthrown by the shock, but this by no means proves that he put all his trust in his first line, and von Hœnig himself admits that under Frederick the number and disposition of the lines varied according to the circumstances of each case. While from the writings of Napoleon we learn that his great cavalry leaders, when fighting the Mamelouks, made point of allowing their first line to be outflanked by the enemy, and that they then, before the latter could compass an enveloping movement, fell on them with the second line on both flanks, and invariably defeated them.

The next point on which there is a difference of opinion is the intermediate formation of line of squadron columns. This Aubier condemns. “The line of squadron columns,” he says, “is a dangerous transition formation, condemned to disappear. Between this and the mass at elastic interval—the practical formation in a broken country—there is only a distinction of words.” The German writer on the contrary adheres to this, as indeed he is bound to do, for with the German tactics, it is the only solution to the problem of manœuvring to gain a tactical advantage. “It is an easy matter,” he says, “to change front or alter direction, even of the first line, as long as it is in squadron columns.” The French method of forming line of battle does away with the need for such a formation, which being one of depth, is bad in the view of artillery fire. They deploy into line by squadrons, each

forming separately, and moving up into its place independently, forming an echelon, first of squadrons, then of regiments, lastly of brigades. Von Hœnig, while insisting on his broad front, admits the attack of the first line in an echelon formation, and this is a mode of emancipation which is remarkable. "Before everything, our attack ought to return to the practice of Frederick ;—the attack on a narrow and continuous front. This does not at all exclude the employment of a line in echelon, provided that the steps of the echelon follow one another quite close—not more than ten or fifteen seconds—and that they preserve exactly their direction." A moderate echelon, he says, is a real advantage.

The German writer condemns the use of succour squadrons, indeed it is very difficult to conceive of what earthly use they could be. They weaken the second line to no good purpose. If they charge, it would be into their own side. If they do not charge, what are they there for?

He also scouts the dread of flank attacks which is so prevalent. "In all sincerity and truth, I affirm," he says, "the history of the war shows, on the other hand, that flank attacks have been rare in the past, and that they will be equally so in the future, because their execution is, and will be, difficult."

It will, I think, be seen from the extracts I have given, that both sides aim at simplicity, but that they seek their common end by different paths.

Von Hœnig would, as a good model, (N. B. Both sides do not use any *normal* formation), deploy three regiments (*i.e.* 15 squadrons) in line, with one regiment as support refused on either flank, and a regiment in reserve. This latter, he considers, should "be thrown into the critical point at the critical moment in the happiest formation."

Aubier, to oppose these tactics, prefers one brigade in echelon, the second line divided, a regiment on either flank close up, and a brigade for the reserve, which must at first be kept *of the fight*, and which must not engage except by fractions, if required. Which of the two is right, and is there any better still? These are questions which we must leave to the great Time, to decide.

NOTES ON CONVOY DUTY.

By Lieut.-Colonel W. HILL, 1-2nd (P. W. O.) Gurkhas.

Some fourteen years ago, I found myself detailed for a variety of convoy duties in Afghanistan (including a large amount of treasure on one occasion, and on another occasion 500 boxes of ammunition). I am prepared to admit that I got through more by good luck than good management.

Shortly after the Afghan war, an order was issued introducing company training into the Indian army, and one of the subjects especially ordered to be included in the course of instruction was "Convoy duty."

My experiences in Afghanistan had only confirmed my previous opinion, that I knew nothing about the subject, and in face of the truism that, "What you don't know, you can't teach," I was much puzzled to know how I was to teach the four companies of my wing a subject that I knew nothing about.

I could find nothing about "Convoy duty" in any drill book or regulation, but I found some interesting information on the subject in "The minor operations of war, by M. Lallemand," and from that I compiled the following rules for the guidance of the companies of my wing, and subsequently of the battalion.

The conditions of service are so varying, that it is of course impossible to make any hard and fast rules, but if a company has to be instructed in convoy duty, we require something more definite than to say, "no rules can be laid down, you must do the best you can when the time comes." Instruction in convoy duty is still a part of the company training, and in the hope that my notes may be of some use to officers similarly situated to myself, I beg to submit them for their consideration through the Journal of the U. S. I. of India.

CONVOY DUTY.

Officer commanding to know what the convoy consists of. An officer commanding the escort of a convoy should know before starting :—

- (a). The number of carts or animals in the convoy.
- (b). The nature of the loads.
- (c). The number of the troops under his orders forming the escort, as well as any man travelling with the convoy.
- (d). The nature of the road, where ambuscades may be expected, as also where open attacks are feasible.

Inspection and telling off of escort.

(2).—The escort, having been inspected by the officer commanding, should then be divided as follows :—

(Say a company of 60 men.)

60 { 10 men as advanced guard.
10 „ „ rear guard.
40 „ „ main body.

The main body should be further divided:—

40 { 20 men as reserve = $\frac{1}{2}$.
10 „ „ centre party = $\frac{1}{4}$.
5 „ „ at head of convoy = $\frac{1}{8}$.
5 „ „ at rear of convoy = $\frac{1}{8}$.

(3).—The officer commanding the escort should not have particular command, but if, from command of the reserve, if necessary, of officers, he is obliged to take, should be the reserve.

(4).—The convoy should be divided into four parts. The and provisions should form the first, second, third, and fourth parts; the munitions, ammunicion, should form the second part.

Should the convoy be composed of carts loaded with arms or treasure, they must be constantly inspected, and no one be on any account to ride in these carts, unless specially ordered by the officer commanding the escort.

(5).—The officer commanding the detachment in the centre of the convoy has charge of the 2nd portion of the convoy. The officer in front has the first portion, the officer in rear the fourth portion.

(6).—The reserve should keep in line with the centre of the column, and whenever a defile, river, bridge has to be passed, if the column is secure, the reserve will pass first; if not, it will march with the main body. Should there be equal danger in front and rear, the reserve may be divided into two equal parts.

(7).—Should the enemy be seen, the reserve will take post at the point threatened, and engage the enemy, so as to give time for the convoy to continue its march.

The officer commanding the reserve must remember that the proper place for the reserve is between the enemy and the convoy. But, as the special duty of the escort is the safe conduct of the convoy, it must avoid any unnecessary fighting, and on no account should any portion of the escort allow itself to be drawn into a pursuit. If the enemy be signalled in any great strength, and it is necessary to park the convoy, the reserve may be pushed forward some distance, to delay the enemy's advance and give time for the convoy to be parked; but even then, the reserve must be careful not to get far from the convoy, and run the risk of being cut off, or find it difficult to fall back on the convoy as soon as the parking is completed.

(8).—The detachments in the centre of the convoy have charge of

Detachments in charge of portions of the convoy never to leave the convoy.

the 2nd and 3rd parts of the convoy, and should not be detached for the purpose of engaging the enemy at any distance from the centre of the convoy.

Neither should the detachments in front and rear of the convoy ever leave the portion of the convoy in their charge.

(9).—A few men as connecting files should be ordered to march

Connecting files.

along the flank of the column to pass orders and signals. These men can

best be spared from the centre detachment or the reserve.

Convoy to march in single line

(10).—A convoy should never march in two lines unless the road is wide

enough for three carts.

(11).—The officer commanding the detachment at the head of

Head of column to halt occasionally.

the convoy regulates the pace, and he should halt occasionally to let the convoy close up.

(12).—Defiles are critical situations for a convoy. The officer com-

Defiles.

manding the escort should send detachments from the reserve to occupy the

heights commanding the road. The advanced guard should be pushed on to reconnoitre the defile, while the convoy closes up near the entrance of the defile.

Half of the reserve may be sent through at the head of the convoy ; and the head of the convoy should halt soon after passing through, to let the remainder of the convoy close up before advancing.

(13).—If the convoy is proceeding more than one march, the cart-

Convoy to march every day in the same order.

men and mule-drivers should be warned to be ready to march off in the morning in the same order as on the first day—

that is, keeping in the same detachments, though not necessarily in exactly the same order.

(14).—The foregoing rules are subject to the many varying conditions of active service, and are only given as a guide to officers detailed for convoy duty. The details will often vary, but the principle of having an advanced and rear guard, and a reserve at all times ready to protect any part of a convoy threatened, should never be lost sight of.



MUSKETRY TRAINING, AND ITS VALUE IN WAR.

By Captain JAMES PARKER, 4th U. S. Cavalry.

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How much does skill in marksmanship add to the efficiency of the soldier? It is worth while for us to consider this question. We, in this country, stand always in a state of unpreparedness for war. In case of hostilities with a powerful nation, this lack of preparation is liable to be taken advantage of. Our regular army is small; our main force will consist of hastily raised levies. These levies will be deficient in all that pertains to the education of the soldier. How much of the brief time allotted to their instruction may be devoted to obtaining a familiarity with the use of arms?

The training of the soldier for battle may, as Von Scherff, a modern authority, remarks, be divided into individual and collective instruction. The individual instruction most necessary in the case of new troops is first, *discipline*; second, a perfect familiarity with the use of the musket at ranges up to 400 yards; third, the development of individual skill in skirmishing and taking advantage of ground and cover. The collective instruction, he says, must first develop the power of moving slowly and with cohesion in close order; second, the ability to perform evolutions and to deploy; third, fire discipline; fourth, a general acquaintance with the requirements of outpost duty.

This, according to Scherff, is a statement of simply that training which is absolutely necessary for the instruction of the raw recruit, when time presses, to make him a capable soldier, and to develop his efficiency for combat. It does not include much that goes to form the seasoned veteran—such as practice in marching and camping, in field manœuvres, in military gymnastics, in sharpshooting at long ranges, in bayonet exercise, and in other details. It may be accepted by us as a fair statement of the training which will be required by the American volunteer infantryman to make him ready for active service in the field.

After discipline, in order of importance, Von Scherff places marksmanship. After the ability to manœuvre he places fire discipline. The Germans say they have good reasons for attaching such importance to skill in the use of arms. The Prussians to-day are the first military nation of Europe. What are these reasons?

As far back as the days of Frederick the Great we find the Prussian infantry formidable through the destructiveness of its fire. The little nation of Prussia, insignificant in size, in resources, and in population, battled for years against France, Austria and Russia combined, and in the end beat them. It was not alone the effectiveness of their cavalry which gave the Prussians the victory; it was not alone the remarkable

discipline, mobility and power of manœuvring of their infantry in a great degree, the thorough musketry training the infantry which enabled it when in action to shoot rapidly and accurately such devastating fire had been known up to those days. The infantry melted away before it, and then, when the Prussians done its work, when the hosts of the enemy were demoralized and thrown into confusion, came at last the supreme moment which Napoleon never failed to seize, to let loose like an avalanche those horsemen who were the terror of Europe, and of which Hamley justly said that no army has since possessed a cavalry leader or a body of horsemen who could claim any superiority over Seidlitz and his splendid squadrons.

Passing over the period of the Napoleonic wars, when the Prussians, as history, opposed as they were to that man of genius whose name was worth a hundred battalions, was one of frequent humiliation, come to the war of 1866—the needle-gun war—when the Prussians, well trained and armed with a breech-loader, won easily the victory over the badly armed Austrians. This war was almost purely an infantry fight. But even the superiority of the needle-gun over the muzzle-loader cannot wholly account for the enormous disproportion of the losses suffered on either side. The Prussians were almost invariably the attacking party, and yet their killed and wounded averaged about one man to every three Austrians. There were no such proportionate losses as these when the breech-loader came into play in our Civil War. On both sides, the tendency for a man whose gun shoots slowly is to fire slowly and carefully. It was the *accuracy* as well as the rapidity of the fire which brought about this remarkable result.

In the war of 1870 we find the Prussian needle-gun opposed to a better weapon with a longer range and greater rapidity of fire, and yet the better weapon was vanquished. This war developed into a series of skirmishes, in which the superior individual musketry training of the Germans had full play. In this war, also, the Germans were more the attacking party. The French, on the other hand, made great use of intrenchments than did the Austrians in 1866. This war was a war of infantry, the cavalry being little used. That the German musketry training was greatly superior, and that they made good use of the marksman's experience that leads him to fire slowly, carefully and at ranges where it is possible to draw a bead upon the object, is apparent from reading the history of that period. We will give a few examples that bear upon this point:

"The defensive attitude of the Prussians showed a marked difference to that of the French in firing tactics. The French fired at long distances, inflicting loss, but not decisive loss. As the German skirmishers ran forward, the French in their excitement forgot to alter their sights and fired over their heads—they fired hastily and consumed much ammunition."

"The Germans, on the defensive, allowed the enemy to approach within 400 or 600 yards. The effect of this close fire, when the enemy came loose, never failed."*

* Adams: Campaign of 1870-71.

Again: "The French soldier was taught to fire at long ranges and thus fell into a fault, which is sure, at all times and under all circumstances, to meet its punishment. They paid no attention to those elements of a sound system of shooting—steadiness, careful practice, and an economy of ammunition. * * * The French opened their musketry fire at very long ranges, from 1000 to 1400 paces. It is true that even at this distance we had men killed and wounded, but if you look into the matter closely you will not find any case where our troops were really shaken by fire at such distances. * * * The German infantry, when on the defensive, did not open fire till the enemy was within 300 or, at the outside, 400 paces. * * * It is not *much* shooting but *good* shooting which is effective. Rapid fire is seldom necessary for more than a few minutes."*

"We were in position to the east of Garenne. In front of Haybes lay two companies of the Kronprinz Regiment, extended in a single skirmishing line. Suddenly, out of the hollow near the Bois de la Garenne, a dense infantry mass appeared, bearing down on the above-mentioned two companies at a run, firing as it ran from the rifles held horizontally at the hip. I estimated it at from 5000 to 6000 men. Presently, my battery had to cease firing at the head of the column, which broke away from the main body, and bore down on the two companies. I turned my telescope on them, and, in contrast to the dense smoke of the French, I saw only here and there puffs of smoke from our line, the whole of which was lying flat on the ground. Only the captain walked slowly up and down the line, warning his men to shoot steadily and slowly. But every shot dropped its man, and the number of advancing foes became sensibly smaller. Individuals succeeded in reaching our line only to fall at the muzzles of our rifles; and the attack so desperately carried out burnt itself out. Only a few survivors turned to run, and these were soon bowled over by our pursuing fire—in ten minutes the whole mass was destroyed by artillery, yet the odds were still nearly as ten to one."†

If the account given in this last extract be true, what further proof is needed to show the vast value of individual marksmanship on the battle-field?

The truth is, the immense importance which the Germans attach to accurate shooting and to musketry practice is not generally understood even by many who have deeply sought for the causes of their extraordinary and astonishing success in war. Concerning their musketry instruction at the present time, Sir Lumley Graham, in his work "The Training of Infantry for Battle," tells us that "it is the object of the most careful attention, being everywhere conducted with extraordinary zeal and method. While it is prosecuted with the greatest activity during the summer season, care is taken not to interrupt the course for any considerable time, lest the soldier should meanwhile forget the instruction which he has received and the observations which have been made to him, so that target practice is carried on even in mid-winter."

* Boguslawski's Tactical Deductions.

† Hohenlohe: Letters on Infantry.

The number of ball cartridges fired is limited to 130 per man but this is a large allowance when we consider the wonderful which prevails in the German army and makes that host of men a burden to the comparatively small German nation. And in these cartridges is wasted; before one is fired, the German soldier has been so thoroughly drilled and schooled in aiming drills, position, gallery practice, firing with blank cartridges, estimating distance, that when the momentous day arrives for range practice he feels being able to hit the bull's-eye even though it be 500 yards away. Instruction in range firing, skirmish firing and collective firing conducted with the same patient zeal and thoroughness, and the obtained in classification and figure of merit are remarkable, considering the limited ammunition. Speaking of these results Sir Lumley says: "It is very certain that the training thus given to soldiers arising from it will produce a great effect in battle." And Napoleon's celebrated saying: "*Fire* is everything—the rest is a small account."

But it is not only from the Germans that we learn the value of marksmanship in war. This element of success in war has ever been lost sight of and underestimated by students of the military art. But it is strange that we, of all peoples, should have shared in this misconception, for it is probable that our indifference as a nation is to-day due largely to the fact that our forefathers were skilled in the use of the *rifle*. The inhabitants of the United States in 1776 were scattered about in a thinly settled, wild and savage country where the abundance of game as well as the predatory habits of the aborigines made it both profitable and necessary to be a good shot. The Americans of those days, therefore, despised an inaccurate musket and armed themselves with the *rifle*, a gun which took two or three times as long to load as the musket, but which had much greater range and greater accuracy. So long did it take to load that the soldiers often wrote home to their friends, sneering at enemies who took a "couple of hours to load and discharge their pieces." But it was not long before they had occasion to repent their ignorance, for some of the fiercest battles of the Americans here were in conflict with these same Hessians. At Bennington the Green Mountain boys, semi-outlaws, held the land on which they were squatters by force of arms, and in what was then little better than a wilderness, defeated in battle these redoubtable European troops, killed, wounded and captured nearly all of them, and drove the miserable remnant in terror from the country they had dared to invade. This they accomplished with a motley force very little superior in numbers. This was a sad affair for the officer who had presumed to criticise the American rifle. It is noted here, that this was not the only surprise for the old veterans of Europe. The Americans introduced then also a new style of tactics suited to an accurate shot and an accurate weapon, the line of battle—the skirmish order, the order of battle of the future. We have heard by some writers on the military art that the skirmish order was introduced at the period of the French Revolution, but they are mistaken.

it was an American idea, one of independence and individuality, one which *we* gave to the world, with others that have shaken governments and thrones.

The successes of the Americans in this war, which finally achieved their independence, were greatly due to their ability and their enemy's inability, to shoot straight. Captain Chester, U. S. Army, in his article, entitled* "Modern Bobadilism or a marksman's method of defeating an army," an article, by the way, that in its views antedates the rifle, contends that marksmanship is all wrong, and that what is wanted is men so disciplined that they will stand in ranks two deep and "at the word of command, turn a stream of bullets in a horizontal direction normal to the front." It was exactly such troops that the Americans encountered. The stream of bullets fortunately went over the Americans' heads and the battle of Bennington was won. This battle so weakened Burgoyne that he was forced to surrender at Saratoga, which produced the French Alliance and resulted eventually in our independence.

Such were the American marksmen, the American skirmishers. They had an American backwoodsman at their head,—Washington,—who years before when Braddock met his defeat and death had been a witness and a victim of the pedantry, the inadequacy, the weakness of the style of fighting that Captain Chester commends.

At Boston, we are told, "the American troops knew little of discipline. Almost all were familiar with the use of fire-arms in hunting and fowling. Many had served in frontier camps against the French and Indians, but none were acquainted with military science or the discipline of European armies." These raw provincials, though not greatly superior in force, cooped up in the city of Boston ten thousand of the king's best veteran troops; and when at Bunker Hill they were attacked they withstood three separate assaults, waiting with the calmness of men who knew the power of their rifles and trusted them, until they could draw a bead on the enemy at 40 paces. In this attack the British lost 1054 men. The result of that fight was the evacuation of Boston.

The battle of King's Mountain was another victory for the American skirmishers and the American marksmen. The British General Ferguson with 1100 men was engaged in 1780 in overrunning the province of North Carolina when he unluckily happened to invade the country of the mountain men and frontiersmen on the borders of Kentucky and Tennessee. He had struck a regular hornet's nest. These rough trappers and hunters, always banded together for defense against the Indians and always ready for service at a moment's notice, swarmed out of their mountain fastnesses with alacrity, in number about 900. They found Ferguson posted on King's Mountain and at once attacked. We read: "The fighting directions were in frontier style. When once in action every one must act for himself. The men were not to wait for word of command but to take good aim and fire as fast as possible. When they

* This article was reprinted in Journal of U. S. I. of India, No. 85, April 1891.

could no longer hold their ground they were to get behind retreat a little and return to the fight, but never to go quite of attack was made in three parties, each on a different side of the m The rifle soon accomplished its deadly work. Three hundred British were killed and wounded and 800 taken prisoners. The cans lost but 20 killed besides some wounded. The result of was the evacuation of North Carolina by the British.

Numerous other instances during the Revolution could be establish the fact that highly disciplined and veteran troops wh shoot straight may fall ignominiously when opposed to men v be otherwise without training, but who are skillful in the use fire-arms.

Turning to the War of 1812 we find a still more notable of the value of the American sharpshooter. In New Orleans ary 8, 1814, General Jackson, with six thousand hastily collected four thousand of whom were riflemen from Kentucky and T defeated twelve thousand veteran troops led by Packenham a from a career of victory in the Spanish Peninsula. Despising trained enemies, the British rashly charged upon our works a flung back with a loss of twenty-five hundred dead and wounded the American loss numbered only 20. When we compare th with that of Tel-el-Kehir, to which it had a remarkable semblam mentioned later on) can we be blamed for regarding skill with as an enormous advantage on the battle-field?

The Mexican War, an extraordinary series of victories trained and uninstructed troops, is interesting in this connection fact that the American army was recruited mainly in the borc and in the South, where the population was and is always fami the accurate use of fire-arms, and where the percentage of ru lation was exceptionally large. Of the whole number of v raised for this war, the North furnished but 23,054, of which came from the New England States. The South contributed almost twice as many, and four times as many as the North i tion to her population. From this fact it is fair to presume th breaking out of the War of the Rebellion the total force of m South trained to the use of arms by actual service in the field outnumbered that of the North.

Nor was this the only advantage in this respect that the S over the North in 1861. The South is and always was a pre rural community, living with a comparatively small population area of country where game was always tolerably abundant. no better school of musketry than hunting. It teaches the qui rate aim and the presence of mind necessary on the skirmish might be said that the whole white population of the South was with the use of fire-arms. In fact it was necessary that they be, for while the negro slaves they held in bondage were gener missive, they were rightly regarded as a dangerous element might at any moment rise in insurrection and have to be put d force.

None of these conditions obtained in the New England States, or the Middle States, or as a rule in any of the states which gave the preponderance of men to the great Army of the Potomac. Game was scarce. Manufacturing, not agriculture, was the prevailing industry. The people lived in the cities. The census of 1890 shows in the Southern states an average percentage of 70 living in the country while in the Eastern and Middle States an average percentage of but 23 is shown. These proportions were much the same in 1861. The farmer's gun was rusty; the city man had none. A large proportion of the men who joined the Army of the Potomac had never fired a gun; few had ever fired a rifle.

Can it be believed that we had the incredible folly to send such men into action without further training? Yes, it is so. There is no official or other data on this subject. Strangely enough no writer seems to have alluded to this extraordinary fact. What we say, we have learned by word of mouth from those who served in that war.

We have talked to many and we have yet to hear of any organization which had any preliminary training in shooting either at a target or at any other object. Our troops were drilled assiduously. Their training in every other way was good. Their discipline, born of patriotism and common sense, was good. That the soldier should be able to perform the manual of arms with precision was thought most necessary. But that the rifleman should be able to use his implement was thought unimportant. Even McClellan, the "great organizer," organized everything but musketry training. He trained his armies to stand up like men and be slaughtered without flinching. They were trained to die, but not to kill.

And so that gallant, glorious Army of the Potomac went on and on to a never failing, never ending series of bloody attacks, of bloody defeats. It was a war of skirmishers. We fought in the woods. Cover, marksmanship, quick aim, the selection of a mark, confidence in one's ability to use the rifle, meant everything. The Confederates had it. The Yankees did not have it. And so they were slaughtered. To take their places fresh conscripts came who also fought their first battle without ever having fired a shot from a gun. Many men in their inexperience loaded their pieces improperly—the bullet down—and in the heat of action went on loading and pulling trigger without being aware that their pieces were not discharged. Among 24,000 loaded muskets picked up at Gettysburg, one-fourth only were properly loaded. Twelve thousand contained each a double charge, and six thousand each from three to ten charges. In some were as many as 23 charges. It was lack of familiarity with their arms that caused this. The man who has loaded often, loads mechanically; and the man who is used to shooting would notice at once the lack of recoil.

That the Union losses in almost every battle of the Army of the Potomac were vastly greater than those of the Confederates, is, it is believed, beyond doubt. If her losses had been even relatively great the South could not have maintained the struggle. The numbers of killed and wounded have been always magnified by Northern writers. Accurate statistics on this point are unobtainable.

In singular contrast to the lack of success of the Army of the Potomac were the repeated victories of the Northern armies in the West. The armies of the West, like those of the South, were recruited from a rural population familiar with the use of fire-arms, and over that respect, the men of the South possessed no advantage. Western armies, as in the Army of the Potomac, musketry training was almost totally neglected. Nevertheless, such was the proportion of soldiers who before enlisting had become familiar with the use of the rifle, that from the beginning the North began to win victories in the West. Donelson was a victory; Shiloh, though a surprise, was not a defeat; Stone's River, Chattanooga, the battles of the Vicksburg campaign, the battles of the Atlanta campaign, Franklin and Nashville were triumphs in which was attested the fact that in musketry the Western soldier was fully a match for his Southern foe. Few great defeats were suffered by the armies in the West. But here were the armies of the East, superior as they usually were in training to the enemy, hurled back with terrible slaughter! What fearful repulses! Read the list: Bull Run, the Peninsular Campaign, Manassas, Harper's Ferry, Fredericksburg, Chancellorsville, Gettysburg, Spottsylvania, Cold Harbor, Petersburg—catastrophes on catastrophes. In reading the history of that war and of the defeats suffered by the Army of the Potomac, the ordinary reader finds no good reason for the never ending failures of that splendid army of troops, magnificent in personnel and equipment, is inclined to be superstitious, and to believe that we did not win until after fearful devastation because it was not intended by some higher power that we should. But I contend that it was *not* a miracle—our soldiers were defeated because they were not properly trained—the workman did not know how to use his tools.

This neglect of musketry instruction continued until long after the war and resulted in many defeats suffered by detachments of the army at the hands of savages in Indian warfare. Many complaints to justify our want of success, were made that the Indian was better than we. As a matter of fact after we had received the Springfield breech-loader we were armed with probably the best military rifle in the world. It was acknowledged that the Indian was a better shot than that was the real reason. The Indian shot well because he shot at a target. Ammunition was scarce with him. He would pay if necessary for the value of a cartridge. But every cartridge represented the loss of a human life. As a rule he did his killing at short range. He had no knowledge of the graduations on the rear sight. He scarcely used it. His idea was to get up as close as possible without endangering himself and then draw a bead. He would never if possible shoot a deer at a distance greater than 100 yards. And so he did, or so he did, in shooting at men. And if behind cover, he aimed at a man's head with hardly more trepidation or excitement than he would at a deer. The fire was deadly. Godfrey in his account of the Custer massacre particularly shows that the troops with Custer were dismounted, inured, and ready for a fight when they were attacked. They were al-

We said at the time—"they must have sold their lives dearly—must have killed hundreds of Indians." There is nothing to prove they killed many. The facts point the other way. Custer's men made a large proportion of recruits. They had received little or no musketry training. They did *not* sell their lives dearly.

If you want to see what men who are marksmen, but are untrained soldiers in every other way, can do against regular troops, deficient in musketry training, look at the Transvaal War. There, on February 28, 1881, some five hundred Boers, rough farmers but good game-shots, defeated a British battalion on Majuba Mountain. The Boers were armed with muzzle-loaders—the British with Martini-Henry breech-loading rifles.* After eight hours fighting the Boers drove them from the mountain with a loss in killed and wounded of 550 out of 650 men and 10 officers. The success of these Boer sharpshooters forced the British to abandon them the political rights they fought for.

If you want to see how men who are regular troops but deficient in musketry training can ingloriously fail where they are largely superior in numbers to the enemy and every other condition is in their favor, look at the battle of Tel-el-Kebir in the Egyptian War 1882. There were 12 battalions of Egyptian infantry numbering 20,000 men, with over 100 field-pieces, behind strong entrenchments, were attacked directly in front by 13,000 British troops. The attack took place at dawn, but it had been expected by the Egyptian troops, who were drawn up behind a parapet to receive it and who began firing on the British at a distance of 300 yards. Goodrich says: "The supply of ammunition was practically inexhaustible. At intervals of three or four yards were open trenches each containing 1000 cartridges. The fire was for the most part directed and too high. It appeared to the British as though they were only resting their pieces on the parapet, loading and firing as rapidly as possible without taking aim. The fusillade was tremendous while it lasted but it could only be really effective when the attacking troops were actually on the parapet." Note that the Egyptian troops evidently intended to carry out Captain Chester's plan of winning a battle—namely pouring a stream of bullets in a horizontal direction normal to the front. But to resume: the British fired a volley at 300 yards, then rushed up to 150 yards, fired another volley, rushed up to the ditch, fired another volley and took the works. This took considerable time. In spite of this fact the British lost in killed and wounded but 450 men! Over a thousand Egyptians were killed, besides their wounded.

Goodrich says: "The Egyptians displayed real courage at Tel-el-Kebir, as the desperate struggle in the trenches and their heavy loss in killed abundantly prove."

It will be seen that this battle exactly resembles the fight at New Orleans, where 12,000 British troops made a front attack on 6000 American sharpshooters and were repulsed with a loss of nearly 2500 in

*Most of the Boers at Majuba were armed with repeating and other carbines of inferior and expensive make. They used also a few Express rifles, Elephant and Martini-Henrys. (From evidence of an eye witness.)

will change all that. On the battle-field of the future the man who has not received the marksman's training will be as useless as a woman. The smoke, especially of his own piece, not being in the way, he will not be led so much to fire at random or in haste. He will always have an object before him at which he may take deliberate aim. That his aim will not as a rule be deliberate, goes without saying, but that it will be much more deadly than if he were in the days of the old powder is perfectly certain.

Musketry instruction in the U. S. army is a thing of very recent date. Up to 1879 we may be said to have had none. Before that time the only chance the soldier got to try his rifle or carbine was at some posts, when he marched off guard, when instead of drawing the charge, he was allowed to discharge it at a mark. Upton's tactics allowed a certain expenditure of ammunition for target practice and some troops fired at a mark five rounds a month—others fired none. About 1878 certain competitions between American and British rifle teams, resulting in victory for the former, aroused a great deal of enthusiasm which spread through the militia, who in some States followed a course of firing laid down in a work by General Wingate, N. G. S. N. Y. In 1879 Colonel Laidley, Ordnance Department, presented the army with a work on rifle firing mainly adapted from Wingate's book, prescribing a course which was ordered by the War Department to be followed. This book was defective and was superseded in 1884 by the Manual on Rifle and Carbine Firing prepared by Captain Blunt.

The army had then already taken hold of the matter in earnest—the publication monthly by the department commanders of the results in companies and regiments aroused a healthy spirit of rivalry and emulation, and ammunition was not lacking. In 1883 (the figure of merit system having been introduced) began the publication by the Adjutant-General's office of the classification and order of merit of organizations. In that year we had 4834 marksmen. In 1884 we had 849 sharpshooters and 7081 marksmen. In 1885 the proficiency in skirmishing was made to form part of the figure of merit of a company. We had in that year 1510 sharpshooters and 9247 marksmen. In 1886 we had 1350 sharpshooters and 9974 marksmen. In 1887 we had 1492 sharpshooters and 11,705 marksmen. In 1888, 1533 sharpshooters and 11,266 marksmen. In 1889 the conditions of qualifications were made much more difficult, the rifleman being judged not by his best four scores, but by the aggregate figure of his last eight scores at the different ranges, to which was added the figure of merit he should obtain in his last four runs at the skirmishing targets. In that year we had

679 sharpshooters and 3966 marksmen.

In 1890, 1000 sharpshooters and 5094 marksmen.

In 1891, 922 sharpshooters and 4593 marksmen.

These figures represent a constant improvement in instruction and results. The slight falling off in 1891 is due to the fact that in that year the artillery did not compete. Roughly speaking, in order to become a marksman according to our present small-arms firing regulations, the soldier after a certain amount of preliminary practice must be

able in 40 shots fired at 6 foot targets at each of the ranges and 600 yards,—160 shots in all—to make an average score of bull's-eye counting 5, centre 4, inner 3, and outer 2; and in 8 fired while manœuvring at the skirmish targets starting at a of 600 yards, at the double, running to within 200 yards, a back, ten halts of 30 seconds each being made, two shots being each halt, or twenty during each run, he must be able to hit the ing figure of a man 32 times, thus making a total score skin and at known distances of 720. The sharpshooter fires in ad shots at 800 yards and must make a total score of 1000. The scores required of first, second and third-class men are less t required of a marksman in a decreasing ratio. This is the in instruction. The collective instruction of a troop consists fir liminary skirmishing at a line of targets, and preliminary volle followed by skirmishing for record and volley firing for reco average percentage of hits in the record skirmishing and vol constitutes the collective figure of merit of the organization. rage obtained by multiplying the number of sharpshooters marksmen by 100, 1st class men by 60, 2nd class men by 30, 3 men by 10, the number of men present but not firing by 0, add products together and dividing by the number of men in the tion, constitutes the individual figure of merit of the organizati figure obtained by adding the individual figure of merit and th tive figure of merit together, and dividing by two, constit general figure of merit of the company battery or troop. The s of ammunition is about 335 shots per man, of which about o expended in collective practice.

This system has accomplished its object—it has clearly po the way, and displayed the reward. It has as a consequence officer and enlisted man with zeal to excel, and it has made an army of marksmen. It is the one thing in the course of in of the soldier that we do well and thoroughly. Conducted as ed and preceded by the proper amount of aiming and positi gallery practice and estimating distance drills, it is superio course in vogue in foreign armies. But no matter how perfect may be there are always grumblers to condemn it utterly, b does not in some respects carry out their ideas. Thus one demns it because we do not shoot in all weathers, snow or rain were possible to instruct the recruit to advantage when the beating in his eyes. By shooting in uniform weather results compared and competition is practicable. Another man in because on the battle-field we fire at the feet of our opponent, v on the target range fire at the feet of a silhouette and cond bull's-eye because it is in the middle, not the bottom, of th True, but on the battle-field we have to fire at a mark, not a in order to hit anything, just as in hunting we have to fire not at a flock; and on the range we fire at the bottom of the l not at the target, the rings being placed on the target to give shots which, striking below, would be effective by ricochets, and

ever or at the sides would hit the body of a man or his neighbor's. Another man claims that on the battle-field the shots are not marked, that the noise and excitement there present, makes firing on the range as instruction absurd, etc., etc. These grumblers all characterize the zeal that animates the officer who with professional enthusiasm works hard to make his company efficient, as "the target practice infantry." The peculiarity of some madmen is that they think the whole world insane. To satisfy the aspirations of our critics I would suggest that the Government erect in some favored spot a target range for their special benefit. On this range have lines of silhouettes advancing, retreating and passing; let smoke be puffed from scores of pipes among the figures; let several large steam-engines produce explosions and horring noises; and within easy range of the firing stand let there be a special machine for hurling large quantities of reasonably hard projectiles toward the firing party, such as cabbages, beets and potatoes in a special state of decomposition to produce the necessary amount of treacherousness among those being instructed. Then during the first hard rain-moment let Captain Grumblesome take his company of recruits down to the firing point—turn on the noises, the smoke and the projectiles, commence firing and let the recruits be well and thoroughly taught how to behave when on the battle-field!

We do not deny however that the present system admits of improvement. For one thing it should be adapted to the needs of hastily raised troops. In this as in all other regulations pertaining to the army every regulation should be arranged with a view to application to a time of war, so that when that time comes, as it will come, suddenly, the arms, the ammunition, the equipments, the supplies, the regulations and the mode of instruction shall all be ready for the incorporation into the militia army of the United States of the American volunteer. For this the course of target practice should not be complicated or hedged about with too many restrictions, but should be made easy for the novice to comprehend. We think the present firing regulations could be greatly improved in this respect.

Second. The skirmish firing should be made the chief feature of the course, and the larger part of the time and of the allowance of ammunition should be devoted to it. It is in fact a drill in the attack position by lines of skirmishers, and its conditions have a certain resemblance to the actual conditions of battle which is not a feature of firing at known distances. The skirmisher moves towards the line of silhouette targets at the double; after the signal to halt he has but a few seconds in which to throw himself flat on the ground, and panting, heart thumping, to estimate the distance, to elevate his sight, to take aim, to pick out his target, to get a good, but quick aim, to pull his trigger steadily without jerking his piece, to notice where his shot goes, to load, and to fire again. To do all this quickly and well requires rapid judgment and lightning-like movement, and is an art that can only be properly learnt by a thorough course of training. It is true *discipline*.

Third. Too much ammunition is expended in volley firing. Practically the same results could be obtained with one-third the present

allowance (75 rounds) if supplemented by a generous expenditure of blank cartridges.

Fourth. The man who has once shown his ability to make man's scores at the known ranges needs little or no further practice in that kind of shooting, and the ammunition now wasted in teaching him what he already knows should be expended in other ways.

Fifth. All soldiers should be instructed in rapid firing at the known distances and on the skirmish range. When we see how men can be taught to fire by a little proper instruction, it seems questionable if there is any advantage in a magazine gun. For instance, during the last target season Blacksmith Kaiser of the 6th Regiment, on one occasion while manœuvring at the skirmish targets, fired 100 shots during the halt of thirty seconds each shot being a high lying-down figure, the distance being about 200 yards. By drill in the manipulation of cartridges the rate of fire can be increased to an enormous extent, and the dangers of having a complicated mechanism in the hands of the troops avoided.

Sixth. Recruits should be required to complete the full course of firing, instead of only a portion as at present.

In considering then, the training to be given our volunteers for battle, it is certain that no matter how short our time of preparation may be, a good part of it must be set aside for marksmanship instruction. The intelligence of the American soldier enables him to master quickly the principal movements laid down in the drill regulations, and his zeal, sense of duty and patriotism, supply to a great extent the place of that discipline gained in other countries. In service. Their peculiar characteristic,—that of never knowing when they are defeated, of seldom being panic-stricken,—makes our troops when acting on the defensive, and when acquainted with the uses of their arms, formidable antagonists, as Bunker Hill and New Orleans testify. In case of a foreign war our greatest danger would be a sudden attack upon us before we had time to get ready, paralyzing our offensive return on our part, and encouraging those factions who would every defeat howl for peace. Our resources and population do not ensure us against such attacks. For instance, although it appears that we have escaped our coast defense theorizers, an active and enterprising enemy having command of the sea and by threatening other points, could capture the city of Washington almost as easily as it was done in 1814. It would take two or three hundred thousand men that we should raise on the spot to get us out of a foreign war should therefore first of all be able to hold out in hastily intrenched lines, and to do this they should first receive instruction in what they most need, the marksman's art. But some say that marksmanship takes too much time, and that the troops must be drilled. There is plenty of targets, plenty of ammunition, plenty of ranges, target practice need not interfere with their drills—the drilling and shooting can go on at the same place and at the same time. A case can be cited where a troop of 60 men went through the entire course of marksmanship, target firing and skirmish firing in nine days, over half the men were in that time qualified as marksmen. This to show what can

in such a crisis trivial objections must not stand in the way—what be done must be attempted. We have good authority for believing with infantry, on the defensive, fire is of paramount importance, that the fire of well instructed troops is three or four times more deadly than that of novices. Think of an assault being delivered over a ground like that at New Orleans, Bunker Hill, Gettysburg or El-Kebir, at a line composed of sharpshooters and marksmen! Why, 100 yards there would not be a man left to tell the tale.

But we should do more than this—we should prepare for war in time of peace. To protect our liberties the Constitution has enacted that every citizen shall have the right to bear arms. But the Government should go further and see that every citizen, available for service, shall have the opportunity to learn how to use his arms. An important part of a soldier's duty can be learned on the target range. Target practice should therefore be encouraged in every way possible and abundant prizes offered by the Government to individuals and bodies or associations of men suited as regards physique, etc., for the military service. These competitions as the practice previous thereto the Government should issue ammunition at cost price. It should prescribe that a military rifle be used. It should maintain target ranges in different parts of the country. It should for a small fee loan rifles to such individuals desiring to undergo the course of rifle practice laid down for the army, and issue to such citizens certificates and insignia of marksmanship. This could be done with but little cost to the Government and under the provision of the Constitution authorizing it to provide for the Army and disciplining of the Militia.

CONCLUSION.

We have attempted in the foregoing pages to show the importance of musketry training has ever had in combat; that battles and even wars have been decided largely by proficiency in the use of the rifle; that history teaches this lesson to Americans especially; that it is a principle of military instruction particularly adapted to a country in which a principle of universal military service can never be established; that simple and inexpensive methods a large number of our citizens, our unorganized militia, may be familiarized with the use of the military rifle and thus gain a certain value as combatants. We trust that something of this kind may be done, and when that dread crisis of a nation's history comes again,—a great battle,—when, amid the thunders of artillery and musketry and scenes of carnage the fortunes, the honor of a great republic are trembling in the balance, let us hope that we may again be able to show the world, as we did in '76, that the American Rifleman fighting in defense of his own fireside is a formidable foe, accurate in bearing, bold of action, deadly in his aim, terrible when he



RUSSIA AND THE INVASION OF INDIA.

Translated from the French by Lieutenant R. A. BROWNE, The Border
Regiment, Interpreter in French.

(The following short pamphlet may be of interest, as representing
the French opinion).

It would take a long time to enumerate the various invasions of
India. The Aryan element, which enters largely into the population of
the Gangetic peninsula, is said to have come from the Hindoo Koosh at
an extremely remote period. The invasions of Semiramis, Sesostris, and
others are also rather legendary than historical, but we have numerous
more and better known instances, extending from Alexander the Great
down to modern times.

Conquerors, both of Mongolian origin, such as Timur and Baber,
and those issuing from Iran and Afghanistan, such as Nadir and
Ahmed of Ghuznee, have penetrated into India to the temporary
ruin of civilization, and have there founded short-lived dynasties,
which were to be overthrown by the next wave of conquest.

Even in the last century, a predatory chief named Ahmed Shah, the
Ameer of Afghanistan, advanced up to Delhi after having crossed
the whole north-west of India.

Most of these invasions had this in common, that they reached the
country by crossing the Suleiman Mountains and the Indus, their starting-
point being the highlands on the north-west of India. This is easily
accounted for by the fact that on all other points India is bounded by
rivers or by sparsely populated and difficult districts. On the north,
the road to India is effectually barred by the towering peaks and enor-
mous glaciers of the Himalayas, Karakorum, and Kuen-lun; on the east,
the swamps and forests north of the Bay of Bengal serve the purpose
equally well. Besides, on the east there is no conquering race, driven
onwards by an irresistible craving for expansion or by the greed of
conquer. India's danger has always been from the north-west.

However, the situation has greatly changed since the close of the
last century, for India is now indisputably in the hands of the English,
whose supremacy extends far beyond the limits even of that vast
peninsula. Baluchistan is now a British province; degenerate Persia
firmly maintains its independence from Russia on the Caspian and
Persian Gulf; the Ameer of Afghanistan is a pensioner
of Great Britain. Further north, the Maharaja of Kashmir is the hum-
ble vassal of the Viceroy of India, whose influence in the small states
bordering on the Pamirs and on Russian and Chinese Turkistan is also
steadily increasing.

Thus we see how greatly the situation has been altered since the last
century. It is no longer Afghanistan or Persia, or the wandering hordes
of Turkomans, which threaten India with invasion. It is a European

power, whose forces are constantly increasing, and whose Asiatic possessions are already larger than those of England. Great Britain recognises, in the powerful northern empire, the only rival who may one day threaten the finest and most important of her possessions, and has therefore, especially during the last few years, followed with an anxious and unquiet eye the progress of Russia in Central Asia.

It may therefore be of interest to note briefly the conditions under which a Russian invasion of India could be carried out, and the difficulties with which England could meet it.

I.

The schemes for the invasion of India are not exclusively of modern date, for at the end of last century a Frenchman,* M. de Sainville, submitted a plan for this purpose to the Empress Catherine. It was marked by more boldness than skill, for it proposed an advance from Orenburg on Bokhara and Kabul; and it is hardly necessary to say that it would at that period have been impossible for an army to cross the steppes of Kizil-Koum.

Some years later Paul I. and the First Consul conceived operations based on more practical lines. Thirty-five thousand troops were to descend the Danube to the Black Sea, on the shores of which they were to join a somewhat stronger Russian force. The combined armies, having crossed the Caspian, were then to advance on Herat and Kandahar, through the Persian province of Khorassan, thus avoiding the Aral-Caspian steppes by ascending the valley of the Atrek.

We know that the death of the Tsar Paul changed the Russian policy, but Napoleon did not on that account abandon the idea of a direct attack on India.

In a despatch written by Talleyrand during the 1805 campaign, that celebrated diplomatist advised Napoleon to exert his influence to urge the Russians towards Asia, so as to hasten the inevitable conflict with England. The question was again mooted in 1812, but it was not definitely abandoned until the disastrous retreat from Tilsit.

The plan was again mooted at the time of the Crimean war. General Khrouleff submitted a scheme similar to that conceived by Napoleon and Paul I. in 1801. This scheme followed the previous one, of crossing the Caspian and advancing on Herat *via* Astrakhan and Meshed, that is to say through Khorassan.

In 1876, at the time when war was threatened in the East, General Skobelev submitted to the Governor-General of Turkestan a detailed plan of operations against India. This plan required several years for its execution, and was briefly as follows:—

After dallying with the Ameer for some time, the Russians were to seize his capital by a *coup de main*, and from that base to enter

* Several of these facts have been taken from an article in the *Revue militaire de l'étranger* for May 1891. [A translation of this article was published in Journal of U. S. I. of India, No. 88, December 1891.]

tions with all the discontented spirits in India, and organize them in a view to combined action. When matters were ripe for revolt, numerous masses of irregular cavalry were to be pushed into the plains of India, followed up by a force of all arms. The whole scheme was, of course, to be on the lines of the great invasions led by Timur and his successors.*

After the treaty of San Stefano, in 1878, when war was imminent between England and Russia, the latter commenced preparations for a movement from Turkistan against Afghanistan, and eventually against Persia. Three columns were to move, the first from the Oxus and the Pamirs against Merv and Herat; the second from Turkistan proper on Herat and Kabul; the last from Ferghana on Kashmir, over the icy heights of the Pamirs. But their total strength was not to be large, as they were doubtless only intended to act as demonstrations to convince England that she is not invulnerable in Asia.

Since 1878 the respective positions of Russia and England in Central Asia have greatly changed.

Russia is now the undisputed mistress of Turkistan; every wandering tribe from the Caspian to the Pamirs has learnt to obey the White Eagle. Besides, the Trans-Caspian railway has an offensive and defensive value, which is now fully recognised in England.

If the operations proposed in 1878 had been carried out, General Steinemann would have had to cross the River Oxus, the Hindoo Koosh, the Sulaiman mountains, before reaching the Indus, and his true base of operations would have been at Orenburg, about 1060 miles from Samarcand. This base would now be at Uzun Ada, the starting-point of the railway on the Caspian Sea, which latter is now in communication with the whole empire by the Baku-Batoum railway line and by the Volga.

In 1878 the port of Michaelovsk, the former terminus of the Trans-Caspian railway, was separated from Herat by about 700 miles of well-nigh impassable desert, the few oases in which were inhabited by nomadic tribes at enmity with Russia. These tribes have now been brought to obedience, and the railway establishes communication between the Caspian Sea, and the river of Herat, and the Oxus, between Uzun Ada, Bokhara, and Samarcand; and will soon be open between Samarcand, Tashkend, and Orenburg. The Russian outposts are now only 55 miles from Herat, while the English have only reached Chaman, 74½ miles south-east of Kandahar, and more than 370 miles from Herat. Accordingly, public opinion has much changed in England, where not quite recently an invasion of India by the Russians was regarded as absolutely impossible.

In 1875, for instance, General Sir Henry Rawlinson, now a member of the India Council, regarded any apprehension on this point as fanciful, and only fit to amuse the gossips of London and Calcutta. Now, however, the probability of a struggle on the Indus for the possession of India is openly discussed.

* "The annexation of Merv," by Charles Marvin.

England is confronted with an undeniable fact—the presence of the Hindu Kush of Asiatic Russia, increasing in power daily, which in course of time will become a strong base of operation for India. Even at the present day the Russians, helped by the Caspian railway and by the actual resources of Turkistan, together with supplies drawn from the mother country, could operate on such a scale as to force England to take them seriously into account.

Competent writers—Mr. Curzon, author of “Russia in Asia” for instance—consider, that if the Eastern question is opened, the solution will be found rather in Afghanistan than in Roumelia, and that the presence of the Russians near the Indus will affect England much more strongly than their entry into Constantinople.

II.

Supposing the Russians to enter upon military operations in India, what would be their lines of invasion? In other words, what main routes would they select for their advance through Afghanistan and the neighbouring countries to the Indus?

According to the late Colonel Valentine Baker, with whom I agree, there would be five main roads from which to select. First, the routes from Samarcand and Bokhara to Balkh, and thence to the Bamian pass to Kabul; secondly the three routes leading from Samarkand, Herat, and Meshed to Kandahar.

These five routes may be classed into two groups, the first of which has its terminus at Kabul, and the second leads to Herat and Kandahar. There is also a sixth route, which starting from Fergana crosses the mysterious “Roof of the world,” the Pamirs, and reaches Kashmir through the valley of Gilgit. But this road leads through table-lands of a mean altitude of more than 12,000 feet, where provisions and fodder are scarce; snow-storms render it impassable even in the three summer months, and it could only be used for small parties intended to create a diversion on the right flank of the Indus line of defence. The English have, however, foreseen this somewhat improbable possibility, for they have for the last few years been extremely active in Kashmir, where their political influence is on the increase. Through this influence, the Maharajah has lately largely increased the garrison at Gilgit,* the key of all communication between the Pamirs and the Upper Indus, and at this present moment, notwithstanding the rugged nature of the country, a military road between the outpost of Gilgit and the north of the Punjab is in active progress.

Already even, the construction of a railway line between Pindi (one of the English strong points on the great Lahore-Peshawar line) and Srinagar, the capital of Kashmir, has been proposed. The *Times* makes no mystery of the strategical importance of such a means of transport.

* In September 1891, the *Times* announced the despatch of several British officers to Gilgit. This was intended as an answer to the Russian military exploring expedition to the Pamirs in the summer of that year.

However that may be, in the case of an Anglo-Russian war the roads lying from Turkistan and Trans-Caspia to Kabul and Herat respectively would be of much greater importance than that over the Pamirs. From the Oxus to Kabul, by the historical "Gate" of Bamian, there are roads frequently followed by trading caravans, and which have been used by great armies. No doubt the Hindoo Koosh between Bamian and Kabul would be difficult to cross; operations would be limited to the summer months, and communications with the rear would be almost entirely cut off during four or five winter months. But from Kabul there is a good road towards the Indus by Peshawar, and the distance to be covered would be relatively short.

However, if Sir Henry Rawlinson is to be our authority, the true line of invasion from Russian Turkistan to India is via Herat and Kandahar. Several well known authorities on Central Asia, such as Major-General Rawlinson in "The annexation of Merv," the author of "Our Scientific Frontier," and several General Officers, amongst whom we may mention Frederick Roberts,* the present Commander-in-Chief in India, are of the same opinion. The Russians would have the choice of several routes to Herat, firstly up the Murghab from Merv, secondly along the border of Herat by Sarakhs, and lastly through a part of the Persian province of Khorassan by Meshed. The last two especially are comparatively easy, as from Sarakhs or Meshed to Herat, we believe there are no high mountains or important rivers to be crossed. Besides, Herat, which is an important pilgrim centre, is already connected with the Russian frontier by a good road, and the neutrality of Persia would not long stand in the way of Russia in case of a war with England. Finally, these three routes would all be based on the Trans-Caspian provinces, whether on the Caspian Sea in one case, or on the Caucasus and Samarcand in the other, and the army could therefore be easily kept supplied with stores.

Thus we see that Russia could most easily invade Afghanistan at the point in the space of about 310 miles between the Oxus and the border of Herat, and it is doubtless somewhere along this line that the main body of a Russian force operating against India would cross the Afghan frontier.

III.

What forces would the Russians be able to dispose of in case of operations against India? We must remember first, that their strength would be dependent on possibilities of supply in these thinly populated and generally sparsely cultivated districts. Besides, to answer the question positively, we should require complicated calculations, founded on thorough knowledge of the country and of its resources in transport, stores, provisions, forage, and water. In the absence of this information, which is not easily obtainable, we can at least compare the approximate numbers given by authorized writers.

* Now Lord Roberts of Kandahar and Waterford.

A German official review, the *Militär Wochenblatt*, in a number published at the end of 1890 and entitled "Russia and Anglo-Persia," declares that in three months Russia could place over 100,000 men in the field against Herat, in addition to which 40,000 troops drawn from the Trans-Caspian provinces, Turkistan, and Western Siberia, would be available on the Oxus to advance against Herat or Kabul. The communication of these two main bodies would be guarded by the forces brought from the Caucasus or from Russia in Europe.

An English writer, Mr. Curzon (previously quoted), the author of the *Times* letters on Persia in 1889 and 1890, has arrived at almost identically the same conclusions. He considers that Russia could concentrate about 50,000 men in four weeks on the Afghan frontier of the Trans-Caspian province.

In addition to this army, drawn from the garrisons of the Caucasus and of southern Russia, the troops in Turkistan and the Omsk province and those forwarded from Russia by the Orenburg mail route to the Oxus and the Sea of Aral, would compose a second force of equal strength. This force would operate either independently against Kabul, or on Herat in combination with the first army, but its concentration would require much longer than four weeks.

Mr. Curzon therefore estimates the Russian forces in Afghanistan in three months after the outbreak of hostilities, at about 100,000. Other troops would be available shortly afterwards, moving from the Volga to the Caspian Sea, and thence to the river of Herat by Murghab by the Trans-Caspian railway.

Russia, as we have said, is absolute mistress of the Caspian. Persian ships of war are not allowed to use its waters. The route from Moscow or St. Petersburg to Herat, convoys, troops, ammunition, provisions, &c., whether moving by land or water, would be under its own flag; no enemy could harass or delay them, and their communication along the whole route would be complete.

We have now roughly noted the Russian forces available for the invasion of India. What strength could England bring to meet them?

At present the Anglo-Indian army numbers some 74,000 British and 145,000 Native soldiers, or a total of 220,000 men, of whom only 120,000 are British. But this force, though by no means to be held in contempt, would not be all available in case of war with Russia.

The safeguard of the vast territories under English sway, from Burma to Kashmir and from Sikkim to Ceylon, has to be provided for.

The general estimate is that at least 100,000 men would have to be temporarily detained to guard the provinces of India. This would leave only 120,000 at the most to garrison Quetta and Peshawar, and to form a field army.

* This article has had the honour of a translation in the most authoritative English military review, the *United Service Magazine*, whose attention to it, though detailed, was by no means conclusive. [A translation of this article was published as a supplement to *Journal of the U. S. I. of India* in April 1891.]

Here we follow our previously quoted authority in the *Militär Wochenblatt*, who estimates that Quetta and Peshawar would require 100,000 men. This would give the Anglo-Indian field army a strength about 100,000 men, roughly the same as that which Russia could bring against it.

We have hitherto taken no account of various other elements which come, on paper at least, as part of the British forces in India:—the Indian reserves, the Anglo-Eurasian Volunteers, and the Imperial Service Troops maintained by certain vassal Princes. We need only say that the military value is extremely questionable; the Native reserve (100,000 strong) is composed of sepoys, either in receipt of a pension, or have left before completing their period of service: they are never recalled, nor have they ever yet been recalled to the colours.

As to the Volunteers, their numbers are small, roughly 19,000; at most they only possess the military capacities of their compeers in the British Isles; that is to say, they have neither officers, military discipline, nor discipline—not to mention other defects. They might be of some value in the defence of a position, but would certainly be useless in field operations. Finally, the Imperial Service Troops, 100,000 men in 1889) are now being re-organized; they have never been used, and it would be rash to reckon on their active co-operation, especially against European troops.

But there is another and a more serious point to be considered, namely that of the reinforcements England could send to India. The actual strength of the British army (not including the forces in India) is about 138,000 men in the active army, and 90,000 in the reserves. Taking into account the garrisons which must at all costs be left in Egypt, Gibraltar, Malta, and in some colonies, the *Militär Wochenblatt* considers that the actual force available would be reduced to 73,000 men, and that even this number would include many non-effectives. The German writer instances the Egyptian campaign of 1882. The War Office had intended to form an expeditionary corps of 32,000 men, but even after calling out 10,000 from the reserves, and taking 10,000 troops from the already weak Mediterranean garrisons, and 4,500 in India, they only succeeded in collecting a small army corps of 10,000 men.

Be that as it may, reinforcements from England would only commence to debouch on the Indus after a month's journey—that is to say, thirteen days at least after the arrival on the Afghan frontier of a Russian battalion which had started from Moscow at the same time.

Besides, the communications of the Anglo-Indian army with the rest of the country would be infinitely less secure than those of the Russian army. Russian cruisers or privateers might easily impede the transit of British troops on the lengthy sea journey between Portsmouth and Karachi or Bombay. Cannot the Suez Canal be seized? or cannot navigation be blocked in it by some accident premeditated or otherwise? Such at least is the opinion of Captain James Bruce, R. N., as declared in an *English Service Journal**; and Admiral Sir G. Elliott goes so far as to

* United Service Magazine, November 1890.

consider that, in the event of naval war, England's best policy is to destroy the canal, and abandon the Suez for the Cape route.

The *Times* adopts the same views in a leading article of the 15th September 1891. "Our true route to India is *via* the Cape, and not Malta, should be the depôt of reinforcements for the Cape. In a European war we should certainly have to use the Cape route. It is a doubtful policy to base all our preliminary arrangements on a hypothesis which would have to be abandoned at a crisis."

"In an important war it would be to our interest to close the Suez Canal and adopt the long sea route to India."

From what we have said, it will be seen that both England and Russia could in three months place roughly the same numbers in the field. The former from Kandahar to Kabul, and the latter from Herat to Kabul. But the English troops would only have in reserve, to fill the gaps caused by battle and disease, a small active army of 140,000, made up to about 230,000 by the calling out of all the reserves. This small army, further reduced by numerous non-effective troops, would devolve the crushing task of guarding Great Britain, the fortifications she holds on every sea, and a colonial empire whose vast extent is even that held by Spain in olden times. The disproportion between the two data of the problem is evident.

A Russian force in Afghanistan, on the other hand, could be almost indefinitely on an army, whose numbers reach nearly 1,000,000 during peace and are raised to four or five times that amount in time. Here then is another disadvantage under which the English army would suffer.

IV.

Such would be the forces at the disposal of Russia and England respectively, for the attack and defence of India. Where would the principal scenes of this mighty conflict take place? Would the English content themselves with a passive defence of their possessions, or would they assume the offensive through Afghanistan? On first consideration the Indus seems to form the best and most easily defensible line of resistance. From Kashmir to the Gulf of Arabia this mighty river, liable as it is to heavy floods, is only spanned by two permanent bridges. Even during the dry season its width and the rapid flow of its waters would render the construction of military bridges difficult.

The English therefore would gain certain advantages by a position along the Indus, were political considerations not paramount in the decision to be taken. Such is, however, the case. If the English were already in possession of Afghanistan, were to reach the very frontiers of India, British prestige would suffer a blow, from which it would not easily recover.

Besides, can a great river stop an invasion? The history of the world proves the contrary. How often have we not crossed the Rhine, the Danube, and the Po in the face of an enemy? Napoleon crossed the Elbe in a despatch to Prince Eugène, "We must take it that the enemy will cross the Elbe where and as he wishes. A river has never been considered more than as an obstacle, which may cause a delay of at t

days. The passage can only be defended by placing strong bodies of troops in bridge-heads on the opposite bank, ready to re-assume the offensive as soon as the enemy commences crossing. But, if one wishes to keep strictly to the defensive, the only method is to so dispose one's troops as to be able to fall in mass on the enemy before the passage be completed. There is nothing so dangerous as to attempt to defend a river by lining the near bank, for once the enemy has got across (which he invariably succeeds in doing), he finds the army in an extended defensive position, and prevents its concentration."

Therefore (and most English authorities agree on this point) it would be to the advantage of the Anglo-Indian army to fight west of Kandahar, and even beyond the Suleiman Mountains. The construction of the entrenched camp of Quetta, of the line connecting that town with the Indian railway system, and which will some day be prolonged to Kandahar, the recent expeditions in the Zhoib valley, and many other measures, which would take too long to detail, prove that such is the intention of the Indian Government in case of war with Russia. Putting all the facts together, and helped by the indiscretions of the English Government, we may be allowed to conclude that Anglo-Indian troops would occupy Kabul and Kandahar on the first rumour of war. This could be easily done by using the excellent road from Peshawar to Kabul through the Khyber, and the railway we have just mentioned, the farthest point reached by which (Chaman) is only about 75 miles from its future terminus at Kandahar. Besides, the English are thinking of constructing a railway along the line of the Peshawar-Kabul road.

Between Kabul and Kandahar there is another town, the occupation of which would be imperative, a town which has played a part in every Afghan campaign—that of Ghazni. These three points, which are already connected by a fairly good road, would mark the English line of defence between the Helmund and the Hindoo Koosh. From thence they could concentrate the larger portion of their forces either on Kandahar, if the Russians were advancing by Herat; or on Kabul, should the latter adopt the Bamian Pass route.

The situation of the English in Afghanistan will become much more dangerous, when the Indian railway system is extended to Kabul and Kandahar. The victualling of troops, the despatch of sick and wounded to the rear, and of reinforcements to the front, in short the various complicated operations which take place at the base of an army, would be carried on under vastly improved conditions. Up to the present, however, the Ameer has refused to authorize the construction of, not only a railway, but even telegraph, lines over his territory, and it is doubtful whether his attitude on this point will undergo any change without the stress of some serious event.

Our conclusions are as follows :—

An invasion of India by Russia would be a difficult enterprise, but one to be regarded as impossible.

Should this invasion be attempted, the principal line of operations would doubtless be by the Herat-Kandahar road. The roads to Kabul,

and above all the paths over the Pamirs, will be used only for false attacks.

It would be to the advantage of England to take up the Ghazni-Kabul defensive line rather than the Quetta-Peshawar line which she now holds.

As to the developments and final results of such a war, it is impossible to prophesy, however vaguely.

Whatever the result may be, it is certain that amongst the events which the future may hold in store for us, few would have so great an influence on the general progress of mankind as a struggle between England and Russia on the frontiers of India.

THE QUESTION OF CAVALRY FIRING WHEN MOUNTED.

Translated from the Russian in the Intelligence Branch, Army Headquarters. (Communicated by the Assistant-Quarter-Master-General, Intelligence Branch.)

The Russian Dragoons, perhaps more so than those of any other, have opportunities for special instruction in this branch of cavalry, and have preserved their peculiar tactics in connection with practice.

In the case of cavalry soldiers who served six years or longer with colours, it was quite possible to give them a perfect training as cavalry, and along with this to accustom them to fight with fire-arms, to initiate them into fighting dismounted.

The rapidity and the order with which these manoeuvres are executed, the silence and skill in managing the horses, the power of carrying out movements in the field at the proper time, are most remarkable, and caused no little surprise to officers of foreign armies. On many occasions in the Caucasus, as well as in the war of 1877 in the Balkans, Russian Dragoons did good service, and established a name, of which they are rightly proud.

These tactics are now being adopted, as they have been often employed by the Cossacks, especially in the campaigns of the Caucasus, in instances in which the Russians had to engage in that extensive and mountainous region.

This war introduced the custom of Cossacks and Dragoons firing from the saddle, namely in the period 1820-60, just as had previously occurred at the beginning of the conquest of Algeria by the Hadjuts and other Arabian races.

Then it was that the military qualities of the Cossacks of the frontiers were developed to the utmost.

At that time the inhabitants of the mountains, fighting for their independence, thanks to their almost daily fights, acquired a surprising aptitude for fighting and a thorough experience of war.

Although the discipline and organisation of the Russian troops were able to overcome all resistance, still at the same time the inhabitants of the mountains surprised the Russians more than once by the aptitude and bravery of their ferocious onslaughts, which were always accompanied by the fire of their single-loaders, and for which one round was always reserved for the moment of the charge. Between these hill-fights and the Cossacks' terrible fights took place.

Although at that time the muzzle-loader was only in existence, still the first shot was fired just before charging the enemy; the carbine was slung over the shoulder, and replaced by the *shashka* (sabre), which was the rest. A last shot was always kept carefully saved up in the form of a single-barrel flint-lock pistol for defence or in pursuit of the enemy, who might try to escape the *shashka* by means of flight. In this manner a number of people were killed and wounded in the

various encounters, not by sabre cuts, but by bullets. During time (in 1849) these Cossacks of the frontier had an opportunity of meeting European troops, namely the celebrated Hungarians. These could not withstand the tactics, in which the employment of the charge, the volley, and the sabre cut, one after the other, overcame the enemy.

One can still meet in the Caucasus old grey-beards who were in that campaign, and who relate that the Hungarians complained of this barbaric warfare, in which a man was often cut from the waist to the waist by the sharp blade of the *shashka*.

The introduction of the repeating carbine, Model '91, into the service of the cavalry, and the services to be expected of this perfect weapon, have again brought forward in Russia this study of tactical problems and duties in the field, which may be affected by the employment of the new arm by cavalry.

An officer of note, General Sukhotine, a supporter of the old tactics formerly attained by men who had less perfect weapons, but whose training and experience had been extensively developed, has come so far as to propose in the regulations for the training of cavalry detachments should be formed for the employment of fire when mounted, both for vedettes and reconnoitring patrols, as also when firing in single rank by small and large groups as practised by the Cossacks in their formation called "Lava."

These proposals, which are antagonistic to the views held in the last century, have given rise to many interesting discussions. Among many Russian officers of note such as Sukhotine, Sayhouff, Suvarov, have taken part.

These discussions have appeared for a long time in the *Invalides*, a paper which, notwithstanding its demi-official character, has not prevented the most diverse and opposite views being expressed to those laid down in the present regulations. The most important of the writings published in the *Invalides* and the conclusions drawn from the discussions on this point have been published in an article by Bojennig in the first number of the *Sbornik* of 1892.

Those who advocate firing when mounted say that the introduction of the carbine of '91 must make cavalry more self-dependent and increase their initiative, especially that of the Cossack regiments. In support of their views they give various instances which have occurred in war, for example that of General Skobelev's escort in the Russo-Turkish war at Yeski Zagra on the 1st August, in which, in a very difficult and rough country, the Cossack Lieutenant Dukmassoff disposed of the Turkish Tscherkessen, three times superior to him in point of numbers, by rapid volleys before charging them.

It is worth while relating this episode in detail, principally for the account of the hero of that deed, which has been referred to in the newly published book styled, "Reminiscences of the Russo-Turkish War" and General Skobelev.

On that day the Khorungi (2nd Lieutenant of Cossacks) had received the order to move off with a section of the 26th

Cossacks of the Don to the right flank of the position occupied by the Russians, and which was being threatened by the Tscherkessen. I moved off at once" writes Dukmasoff "to the place appointed, working my way with difficulty through vineyards and deeply-cut cross roads; *en route* we came across crowds of Bulgarian refugees, men, women, and children, who in fear and trembling cried out, "Turks, the Turks." From a curve in an excavated road I glanced suddenly towards the enemy, and perceived a cloud of dust, which was rapidly approaching us. After careful observation I became aware that half a sotnia of Tscherkessen was advancing at the trot on the road to Philippopolis."

"As the nature of the ground prevented me from handling my men as cavalry, *i. e.* from charging the enemy, and as there was no time to dismount, I decided to receive the enemy with a volley fired from the rifle."

"After I had formed up my section for the fight and advanced to about 150 paces of the Tscherkessen, I sung out the command, "Section, fire." Suddenly I heard some of the Cossacks in the ranks remark, "Our honour, why those are our own Cossacks"!! Indeed the uniform of the horsemen now advancing towards us was so like our own, that, at the moment, I became uncertain. The absence of the shoulder straps assured me, however, that we had to do with subjects of the Sultan and not with subjects of the Czar. At that moment they were quite near me. I discerned their sun burnt faces, their dark sunken eyes, and the stern expression of their countenances. "Ready", I called out lustily. "They are the enemy." "Fire." A volley was discharged, and two Tscherkessen fell from their horses. The others, surprised by this unexpected rifle fire, moved off to a flank, and retreated rapidly under the rifle fire of our sotnia. After having defeated with my section another three times its superior in numbers, I continued my movement towards the right flank and arrived at the time appointed on the road to Philippopolis. There I selected a small position near the town itself, about 150 yards in front of which the vineyards commenced. Thus we hid ourselves between our own sotnia and a company of Bulgarian Tscherkessen, which held in its possession the whole country situated between Philippopolis road and the mountain heights."

"I had not decided as to the best way of carrying out an attack, when suddenly a chain of Tscherkessen horsemen appeared, and at the same time a complete squadron of the enemy advanced down the road, led by their chief in a magnificent blue uniform. It was a critical moment, and if the enemy had only been a little smarter and more energetic, we must have been annihilated."

"To attack with a handful of men would have been folly; so I decided to see the effect of rifle fire. "Take good aim, comrades," I called out, turning towards the Cossacks, and then gave the order "section, fire." Some of the horsemen were bowled over, the others remained halted, undecided what to do. The Cossacks loaded their Russian carbines rapidly, and again I gave the command, "Section, fire," and in the mean time decided to charge the enemy after the second

volley, but just at that moment the Tscherskessen turned and bolted. I sent a third volley after them, and then formed "Lava" (the single rank attack formation of the Cossacks), in order to pursue the enemy."

"The broken country, the vineyards, and the deeply-cut ravines did not permit us to follow at full speed; consequently the Tscherskessen, well accustomed to this difficult country, had soon put a good distance between us."

"Having collected my men, I returned to the little position which I had previously taken up. The result of the two volleys was that we had killed two and two wounded."

Here we see two critical positions, out of which a troop of Cossacks has issued with honour, thanks to the skill of the leader, thanks to the manner in which he knew how to utilize the qualities of its arm, and thanks also to the manner in which he understood, in order to extricate himself from so difficult a position, how to decide and select the most suitable for the peculiarities of the situation, and not the one which had been laid down in the rules and regulations.

On the one hand the nature of the country, on the other the tactical weakness of the Russians did not permit the attack of the Tscherskessen to be met by a charge. The firing from the saddle to admit of the same results being attained, which should have been obtained, had Lieutenant Dukmassoff's troops been superior to the enemy in point of numbers. General Sukhotine backs his opinion by similar examples, in order to prove that one gains time and better results, by firing from the saddle than by charging. He says that men are efficiently trained, and fire either independently or voluntarily without dismounting.

At the same time, the conclusion arrived at by means of discussions would seem to be, that if even this method of fighting is successful against certain enemies, however warlike but wanting in organisation, it is sometimes accompanied by good results, still one cannot count on its result on the battle-fields of Europe, and with the European armaments of the present day.

All great leaders who have expressed an opinion on this subject, especially Charles XII. and Frederick II., have scouted the idea of firing from the saddle, in order to imbue their cavalry with the old established rôle viz., that of charging with rapidity at the enemy's time and with the naked weapon, lance or sword.

Frederick II. estimated the value of this mode of firing only as a means for the pursuit of broken cavalry, for vedettes and for singling out the enemy. He deprecated it most strongly as an introduction to the charge.

Although General Dragomiroff is a great supporter of the idea of firing from the saddle, he agrees with the former opinion that it is only a means for the pursuit of broken cavalry. "As soon as the trooper is mounted, he should only make use of his naked weapons." General Leer has expressed himself in the same manner in his book, "Applied Tactics"; he does not believe in firing from the saddle, and refers to Turenne, Charles XII., Peter the Great, and Frederick II., as supporting this opinion. Finally, Sukhonli

the Caucasians themselves, to whom these opportunities so often are far from adopting these views, which the supporters of firing from the saddle attribute to them.

"Do not believe," said a man of great experience, "that the Dragoon of the Caucasus, led on to a European battle-field, will make use of the method of firing from the saddle in close order. Experience will protect our regiments from such a mistake." Several military men quite agree on this point.

Whatever may be decided, this interesting discussion has had the effect of showing clearly, that in the Russian army they are far from regarding the rôle of their cavalry to have been decreased by the introduction of new arms and smokeless powder; but rather it is maintained that in this weapon will be found a new motive for self confidence and independent action.



**of Members who joined between 18th March and 25th
April 1893.**

Rank.	Name.	Corps or Department.
tenant ...	Agnew, Q. G. K. ...	▲ D.C. to H. E. the C.-in-C. in
t.-Col. ...	Clark, W. ...	2nd Oxfordshire L. I. [India.
er ...	Craigie, J. H. S.	Highland L. I.
m. Lt.-Col. ...	Exham, R. ...	M. S.
ain ...	Fuller, R. W. ...	R. A.
t.-Col. ...	Gildea, T. S. ...	Gordon Highlanders.
er ...	Gordon, R. ...	22nd Punjab Infantry.
t.-Col. ...	Grant, H. G. ...	Seaforth Highlanders.
t.-Col. ...	Harley, G. E. ...	The Buffs.
Lieut. ...	Hudson, A. K. ...	17th Bengal Cavalry.
tenant ...	Macdonald, R. H. ...	R. E.
er ...	Mackenzie, K. R. ...	Seaforth Highlanders.
t.-Col. ...	McClintock, W.G.W. ...	2nd Yorkshire Regiment.
t.-Col. ...	Mecham, J. R. ...	2nd Scottish Rifles.
t.-Col. ...	Morris, A. W. ...	2nd Northamptonshire Regt.
t.-Col. ...	Noyes, A. W. ...	2nd West Yorkshire Regt.
ain ...	O'Leary, T. E. ...	Royal Irish Fusiliers.
t.-Col. ...	Peyton, C. T. ...	2nd Durham L. I.
nel ...	Prendergast, C. L. ...	28th Punjab Infantry.
t.-Col. ...	Prickett, T. ...	Essex Regiment.
ain ...	Ross, C. R. ...	14th Sikhs.
Col D.S.O. ...	Rose, H. M. ...	27th Punjab Infantry.
t.-Col. ...	Swaine, C. E. ...	11th Hussars.
t.-Col. ...	Swetenham, R. A. ...	27th Punjab Infantry.
t.-Col. ...	Whitton, J. ...	Royal Scots Fusiliers.
ain ...	Wilson, C. E. ...	2nd Durham L. I.
ain ...	Ringwood, H. ...	Adjutant and Inspector E. I. Ry. Volunteer Corps.



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THE DOUBLE COMPANY SYSTEM.

LIEUT.-COL. E. G. BARROW, THE HONG KONG REGIMENT.

Of the many questions which exercise the minds of Indian officers, none perhaps is of more direct and practical importance than the distribution and employment of the British officers of a European infantry regiment. Many of us are at variance as to the number that should be allotted to a battalion, while on all sides there is a strongly expressed desire for more British officers ; but at the same time, apart from financial considerations, there are many other reasons for not depreciating the position of the native soldier by increasing the British element, and in any case it is highly likely that any radical change in this direction will be made for many years to come, and certainly not till financial equilibrium is restored by some at present unforeseen appreciation of silver. The result is that any scheme or discussion based on a larger establishment of Europeans must be for the present purely academic, and it is therefore of far greater practical importance to enquire how the number we now have can be usefully employed. I think I may fairly claim to be able to throw some light on this subject, as I can approach it, not merely with theoretical arguments, but with the results of practical experience. I will therefore make a few observations for once more bringing to notice that well worn theme, the double company. I have for many years been of opinion that the existing system of the native army is not only cumbrous from an administrative point of view, but ill adapted to meet modern requirements, while at the same time it has a most paralyzing effect on the energies and individuality of the younger officers. Holding these views, I welcomed the opportunity afforded by the formation of the Hong Kong Regiment of putting these ideas into practice. General Gordon, the Assistant Military Secretary at the Horse Guards, who was President of the committee assembled to report on the organization of a regiment for the East at Hong Kong, warmly supported my views, and practi-

cally I was given a free hand, though officially the wing was retained, and wing commanders and wing officers duly attached to the new regiment.

My first act on meeting my brother officers in India was to inform them that I proposed to work the regiment on the double company system, as far as the recruiting, the training discipline of the regiment were concerned. I was unable to do so in the system of payment and accounts, and moreover I proceeded with the change in a tentative manner: command what may be called the administrative duties were left in the hands of wing commanders, but as far as possible I handed over the executive functions to the double company commanders. The new drill allows only three mounted officers, one of whom is the second-in-command, and partly in consideration of this, and partly because I think so senior an officer should as a rule be required to command such a comparatively insignificant command as two companies, I decided that the second-in-command, apart from his administrative duties as a wing commander, should only exercise a general supervision over all ranks, taking such special duties as the commanding officer might delegate to him, that is to say, in the Hong Kong Regiment the second-in-command has no direct command under his immediate orders. Omitting him and the two regimental staff officers, there remained the junior wing commander and three wing officers available for the command of the double companies. The wing commander was given the direct command of one of the double companies in his own right, as far as those two companies were concerned, had precisely the same powers and duties as any one of the other double company commanders. The regiment was thus divided for training and command as shown below:—

Commandant and Regtl. Staff.	Wing Commanders.	Double Coy. Commanders.	Companies.
Lt.-Col. A.	Major D.	Lieut. H.	{
Lt. and Adj. B.		Lieut. G.	{
Lt. and Qr.-Mr. C.	Captain E.	Lieut. F.	{
		Capt. E.	{

This division of command having been settled, it became necessary to define how the principle was to be carried out, and the easiest way of describing this will be to give *verbal* orders I thought it expedient to issue on the subject. They were as follows :—

Wing commanders will exercise a general supervision over the companies, but they will at the same time be careful to avoid needless interference with the double company commanders, unless fully trusted, cannot be expected to take a proper interest in their commands. The system of double company commands is instituted by permission, with a view to giving the wing officer in the regiment specific functions, and a direct personal interest in the efficiency and discipline of a distinct portion of the corps. It is only by the delegation of authority and portion of responsibility, that so large a body of native soldiers as a battalion one thousand strong can be thoroughly supervised by the small staff of British officers on its establishment, and it is hoped that wing commanders will cordially co-operate in securing the success of this experiment by allowing their double company commanders all reasonable latitude.”* * *

The wing commander is responsible for the general efficiency of his wing in every respect, but he will delegate to double company commanders, as far as possible, the control of their respective companies especially as regards drill, training, and discipline. The wing commander is entirely responsible for the pay and clothing of his wing, and will also conduct all correspondence connected therewith.”

* * * *

The relations of double company commanders to wing commanders in performing their duties will be guided by the following instructions :—

(1.) *Drill and training*, as previously notified, will be left as far as possible to double company commanders, but when a company goes to target practice the wing commander becomes responsible for its proper execution, and all orders must be taken through him, as the case may be. *

Musketry matters were only placed under the orders of wing commanders, unless two officers are struck off duty for musketry, the work comes heavy. The practice in this regiment is therefore for both the wing and double company commander to be struck off duty together.

(2.) *Kit Inspections &c.*—These will be conducted by the orders of wing commanders, but will ordinarily be carried out by double company commanders.

(3.) *Musketry appliances.*—For these the wing commanders alone are responsible, and they alone should give orders.

(4.) *Prisoners.*—Should be brought up by double company commanders, who are necessarily better acquainted with the details. They are responsible that in the case of minor punishments necessary information is given to the adjutant.

(5.) *Promotions.*—Double company commanders must bring to the notice of wing commanders the men they consider for promotion, but no promotions will be made, or official orders issued, without the knowledge of the wing commanders.

(6.) *Pay Sheets, Correspondence &c.*—For these the wing commander alone is responsible.

(7.) *Sheet Rolls.*—For these wing commanders are alone responsible, though they may of course entrust their preparation &c. to the double company commanders.

(8.)—*Indents.*—All deficiencies should be brought to the notice of the wing commander, by whom all indent orders should be submitted. Double company commanders have nothing to do with the Quarter-Master.

(9.)—*Rations, Company Funds, &c.*—These are matters of direct supervision of double company commanders, who must, however keep the wing commanders informed of what is going on, and pose to do with the money in their hands."

The above extracts will, I hope, show generally the principle on which I proposed to act, and in order still further to accustom the officers to the principle, I endeavoured as far as possible to give each officer a personal interest in the enlistment of the men whom he was to command. The officer named to command the Pathan companies was sent out to recruit Pathans. The officer appointed to command the Hindustani and Cis-Sutledge companies was sent to recruit the Hindustani and other regiments, from which transfers of men might be expected. One double company was composed of Awans and Shahpur men, more especially Awans of the Salt Range and of Pindus and Gujrat men, especially hill men from the Himalayas, such as Saltis, Chibhs, and Ghakkars, and the officer for these four companies was conducted mainly through the officers who were to train and command them. This of course gave each officer a special interest in exercising great caution in enlisting men, whether transfers or recruits; and though the idea of an officer raising his own companies could not be carried out in entirety, more especially as regards transfers, yet I thought

that in each officer's command the bulk of the men have been led by himself. At all events as far as getting recruits went, the men worked thoroughly well. The officers concerned threw themselves into the work with great zest, and in two months from the day the first recruit was enlisted the regiment was nearly up to full strength of a thousand men, and I may mention in proof of the quality of the material thus obtained, that the average height of the men is 5'8½" and the average chest measurement 31"-33", and although nearly 200 of the transfers were under 5'8". Of course I am well aware that what attracted good recruits was the pay, but nevertheless I believe that the discretion exercised by the recruiting officers in rejecting all but robust lads was the cause of success.

The chief duty that next fell on the double company commanders was fitting and equipping their men with the various articles of clothing and equipment. The time was short, the Quartermaster had not joined, and so the whole work fell on the officers, and here again I found distinct advantages in the double company system. Each officer was anxious to get his own command fully equipped as quickly as possible, and with well fitting clothes. After time suits were rejected and had to be refitted by the officers, and an amount of individual care and attention was bestowed, which I am quite sure would not in the time have been possible under any other system.

Very little could be done in the way of drill and training when the regiment arrived at Hong Kong, but for the first five days after arrival there, the recruits were left almost entirely in the hands of the double company commanders. Each had on an average about 150 recruits, so that there was ample scope for their own energies. They were allowed to choose their own drill instructors out of their own commands, and were given complete liberty as to the system on which they trained the men, as long as there was no departure from the precepts of the drill books. The great difficulty they had to contend with was the want of drill instructors, and this will be fully appreciated, when I mention that there are only twenty N. C. O's in the regiment who were N. C. O's before they joined, and of these only about six were of sufficient use as drill instructors, so that as a matter of fact the officers had to create a drill staff as well as instruct the recruits.

This was a matter of much difficulty, and at first progress was slow. Luckily we had an excellent drill havildar and some energetic native officers, and by their help and example the drill instructors made rapid progress, so that later on the progress of the recruits became equally marked, and by October the whole

of them were equal to taking their places in battalions while the old soldiers were handed over to the second-in-command and the adjutant, for as it may be imagined with difficulty of volunteers from some forty different regiments, there was a decided want of uniformity, so that the old soldiers were given as much attention as the recruits. After four or five months, however, when the recruits had mastered the rudiments, they were joined to their own double companies, and all were drilled by their own commanders. The result of this system, which led to a certain want of uniformity, was on the whole, however, caused a good deal of emulation, and enabled the commanding officer to observe in what respects the system in one regiment was better than that in another, while the officers, by pointing out the deficiencies in their commands, were able to redress them by efforts to improve in such respects. Thus I may mention that the drill and movements generally of one double company were better than those of another. A second double company might be better in the handling of arms, whether at manoeuvres or at physical drill, while a third would show a marked superiority in musketry positions. This I think has ultimately led to a general improvement all round. The best feature of the system has been the standard to which all have endeavored to attain, instead of a general uniform average of good and bad all round.

Apart from the benefit to the men in this respect, I may note the following advantages to which the system leads directly or indirectly :—

(1.) Every officer has had complete scope for his own command, and I feel confident the junior officers have distinctly increased their capacity for command and for assuming responsibility.

(2.) They know thoroughly well the men in their commands, and in making promotions the commandant is enabled to rely more on their judgment than on the recommendation of prejudiced native officers.

(3.) The men are more in touch with the British officers than under the wing system, under which as far as experience goes, it is usually the officer's orderlies or the relations who come to the front.

(4.) Companies sent on detached duty can as well be sent under British officers thoroughly acquainted with the country. For instance in this garrison on mobilization three divisions are furnished to different parts of the defences, each division will be furnished by different double companies, and each commanded by its own officer.

) A strong spirit of emulation has been created, which, if rightly directed, should tend to the constant improvement of the regiment.

Against these advantages it is only fair to mention, that it is urged that if an officer goes sick or on furlough, another is to replace him, and that if the quartermaster should not be available for this duty, some one officer will suddenly be in command doubled. This is true, and during the hottest time it will almost invariably happen, but for all that the system does not collapse. Of course, for the time being, the double company will suffer to a small extent, but in the long run it will be no worse off than it was under the wing system. During the drill season as a rule, that is to say during the important time, an officer will be available to command each company.

Again it may be said that the second-in-command becomes less executive in his capacity. I do not think so. It is true he has less executive authority, but on the other hand it accentuates his position as *second-in-command*. It is his duty to assist the commandant in the exercise of general supervision, and he should not be engrossed in the details of training a small sub-unit, employment which may far more suitably be delegated to younger men; while on the other hand the commandant, though still responsible, may with advantage delegate to him some particular part of his own duties, such as the general supervision of the musketry or of the drill of the regimental institutions, or even of the regimental offices. The important point is, not that this officer should have a separate command of his own, but that he should be closely in touch with the commanding officer, and ready to take his place at any time.

A third objection is, that the adjutant's prestige suffers by the system, and that he ceases to be the officer, to whom the credit of the drilled battalion now so often attaches. This, to my mind, is a distinct recommendation. The adjutant should be regarded as the confidential staff officer of the C. O., and not as a subordinate. Except as a staff officer, no one should come between the commandant and the commanders of lesser units. The adjutant should have no more to do with the drill of the regiment than any other officer, except that he should as a rule be in charge of the recruits; for, except in a special case, the raising of a new regiment, it would generally be very inconvenient and interfere materially with the training of the regiment if the double company commanders had to conduct the training of the small batches of recruits that annually joined their

commands. Hitherto, in the Hong Kong Regiment, they have been trained by the double company commanders : they would have had but little to do, as in some cases their men were recruits ; but in future this duty will be to the adjutant. A further objection is that one of the companies will have to be entrusted to a very junior officer, probably a probationer. Again I think the advantages of the arrangement outweigh the possible disadvantages. Give the officer responsibility, put him in a position where he must show himself or bring to light his own incompetence, and as he will rise to the position, and become twice the soldier he has been, had he only casual and perfunctory duties to perform. The truth of this axiom has, I think, been fully demonstrated in the campaigns in Burma, where inexperienced smooth-bore volunteers have acted with a vigour, enterprise, and discretion which would have done honour to war-worn captains.

The only other objection I have heard is that the administrative and tactical units are not the same, but that this applies equally to the wing : in fact the larger your administrative unit, the less does it conform with the tactical unit, and the smaller is the company.

I may mention that at the end of the year I called on all the officers to express unreservedly their opinion on the subject, and two only deprecated the change, the others were strongly in favour of it. One of the two opposed to it was unfortunately absent from duty through sickness during the first five months of training, and he consequently, I think, was in a position to give an unbiassed opinion. He had not experienced the difficulties the regiment had to contend with, and did not therefore appreciate the advantages the new system offered. Moreover he came to the subject with all his former ideas. After a certain age the mind of man is usually very conservative, and considering we had all been brought up under the old system, that of the wing, I think that when only two officers in favour of the change are found, after full trial of the other, to condemn it, the conclusion is reasonable that the new system has met with success.

Having now stated, I think impartially, the whole case, presents itself after a year's experience, I will only say in my opinion the double company system would gain much by the abolition of the wing commander. I should like to have a second-in-command who would have no executive duties, who would be the paymaster, not merely of one wing but of the whole regiment, and would also be the C. O.'s

and chief adviser ; while the double company commanders thus be given a freer hand, and the one possible cause of on, namely the intermediate organization of the wing, would moved.

In that case some re-arrangement of pay and allowances would be necessary ; but I do not at all hold to the theory, that all the double company commanders would be performing equal duties, all should be equally paid. Due weight should be given to age and experience, and the captain or subaltern, if not personally worth more to the state, at all has earned more by length of service from the state than a young officer who is serving his apprenticeship ; while there is more reason why all should be paid alike than there is for squadron commanders alike.

Given our present complement of officers, I would allot the command somewhat as follows :—

Allowances.				Contingent or Office.
			Rs.	
Mental Staff...	{ 1 Commandant	at ...	600	.....
	{ 1 Second-in-command	...	270	120
	{ 1 Adjutant	...	200	50
	{ 1 Quartermaster	...	150	30
Double Company Commanders.	{ 1 Officer	...	200	10
	{ 1 ditto.	...	100	10
	{ 1 ditto.	...	100	10
	{ 1 ditto.	...	100	10
	Total	...	1720	240

This makes precisely the same amount as is given now, though personally I think the staff pay of the second-in-command should be raised to Rs. 300, and of one of the double company commanders to Rs. 150, so as to raise the status of the former and give a progressive rate of increase for the latter. But this question of pay is of course a matter apart, and need not be discussed. I have given a small contingent allowance to each of the double company commanders, as they will require something

to pay for stationery, repairs to arms, and odds and ends would not be necessary for them to keep writers, as all correspondence, &c., would be dealt with by the second-in-command out of his contingent of Rs. 120. It will be noticed that by robbing the wing commander, I have given 30 Rs. office to the quartermaster, and this there is a general consensus of opinion should be allowed. An office allowance would I am right in saying, have been granted before now, but only for financial exigencies. Of course with such an arrangement, it should be clearly understood that both the adjutant and the quartermaster would be available for the command of their companies in addition to their own duties, and that the adjutant should carry with it half the extra staff pay, *if available*.

I trust I have not stated the aspects of this question fairly. Though myself strongly prejudiced in favour of the change, I have endeavoured to watch the experiment in the regiment with an impartial mind, and have made every allowance for the slight friction which has occasionally arisen. As I am that the experiment has been successful, I feel free in proclaiming its success, and urging its general adoption in the Indian army, failing any more liberal scheme which would give us a larger proportion of British officers.

TRAINING OF THE NATIVE INFANTRY RESERVES IN THE PUNJAB.

BY CAPTAIN J. POLLOCK, 3RD SIKH INFANTRY.

The present system of training reservists with the depot battalion does not meet with such favour with reservists as the system of training with their own regiments, and from enquiries made, I think if the old system is not carried out, they prefer to be trained near their homes ; and it is with this that I have worked out the following scheme.

I have not taken the 39th or 40th Punjab Infantry into consideration, nor have I taken into account the Hindustani Mahomedans about Delhi, as only about two companies are enlisted in these regiments.

The present depot centres are :—

Peshawar	...	Sialkot.
Rawal Pindi	...	Jullundur.
Jhelum	...	Ferozepore.
Mean Mir	...	Dera Ismail Khan.
Multan	...	Edwardesabad.
Kohat	...	Mardan.

By the present system a very large amount of extra work is done on the depot battalion, which I think can be better carried out if the reserve is worked on something like the same system as the depot battalion is now done.

There are in the Punjab approximately—

40	companies of Pathans.
40	„ Punjabi Mussulmans.
86	„ Manja Sikhs.
46	„ Dogras.
48	„ Malwai Sikhs.

The Guides have also one mixed company, and one company of Pathans ; the 33rd Punjab Infantry have also two companies of Hindustani Mahomedans. These are not allowed for. This scheme is based on the supposition that men are sent to the reserve in proportion to their classes in regiments. This allows for 27 or 28 reservists per company. I have allowed 27.

According to the above, if the reserves are up to full there will be :—

- 1080 Pathans.
- 1080 Panjabis.
- 3564 Manja Sikhs and Dogras.
- 1396 Malwai Sikhs.

I would suggest one reserve officer at Rawal Pindi and Punjabi Mussulmans, with an assistant at Peshawar.

One reserve officer at Mean Mir for Manja Sikhs and Dogras, with an assistant at Sialkot.

One reserve officer at Ferozepore.

Ferozepore and Rawal Pindi having arsenals, the accoutrements for these places could be stored in godowns would only be required for clothes ; but at the other places, viz :—

- Peshawar.
- Sialkot.
- Mean Mir.

Godowns should be built for storage of arms, accoutrements, and clothes, as it is better to keep these stores at reserve centres, in case reservists are suddenly required.

As arrangements are now being made to build reserve centres, the money required could be obtained from funds sanctioned or estimated for. To look after all the reserve centres, I would suggest a certain number of pensioners being employed. I do not think there would be any difficulty in this, as pensioners are generally glad to get employment near their homes.

A small staff of drill instructors would be required to drill men joining the reserve, after discharge from their regiments. These instructors might be seconded for a period of 3 to 5 years from their regiments.

All reservists should have one pattern of uniform ; the pattern of uniform is workmanlike and simple :—

- 1 khaki blouse and knickerbockers.
- 1 pair khaki pattis.
- 1 khaki pagri with khaki fringe.

On joining regiments, they might be supplied with a khaki blouse and khaki pagri with khaki fringe regimentally.

All uniform should be made up at the reserve centres. Men, as they join the reserve, should be sent to the reserve centre to be clothed and fitted out.

The names of reservists would be kept in rolls at the reserve centres, also battalions, and rolls of men in each tehsil should be kept at the reserve centres. Copies of these rolls would be forwarded to District Officers.

I have them carefully checked and corrected, so that in case reserve was suddenly called out, there would be no delay in getting the men.

The reserve centres being near the men's homes, they would be called out much quicker than at present and with much less expense, as the reserve officers would only have to send to the District Officers to call out the men on roll no. so and so. This would save a large amount of clerical labour. Should any alteration be made, the fact would be notified to the District Officer or a list sent him.

The men, on joining, could be at once fitted out, as all stores would be at the depot, and then sent on in a batch, either to the regiment requiring them or its depot, or to the depot regiment; but I think this system of calling out the reserves would be found to work well. It might be tried in one district first as an experiment.

On orders being issued for training, the reserve officers would report to Officers Commanding Divisions or Districts the number of reservists joining for training at the reserve centres in their commands.

Orders would then be issued for the necessary instructors to be detailed from regiments in the command. This would save a large expense in railway fares of instructors being sent from distant battalions to depot centres as at present. From the instructions, the following staff appointments should be made, if possible at each place :—

- One Subadar-Major.
- One Jemadar Adjutant.
- One Drill Havildar.
- One Pay Havildar per 100 men.
- One Bugler per 200 men.

- * One Armourer.
- * One or two mochies.

The followers as below should also be allowed :—

- One Sweeper per 100 men.
- Two Langris per 100 men.
- Two Bhistis per 100 men.

Also one Dhobi and one Barber per 100 men, to be paid by the men themselves.

It would probably be best to have an armourer and a mochi attached to the depot centre as part of the permanent staff.

All ranges and appliances at the centres should be at the disposal of reserve officers, the lead fired being sent from head-quarters to* out-stations so as to arrive before the training commenced, some of the pensioners being in charge to help unpack and distribute them.

All stores should be packed so that those of the three linked battalions would be together.

Three officers would be required for two months as assistant reserve officers, at Kohat, Jhelum, and These officers would be detailed by G. O. C. divisions, and join fifteen days before training commenced, and would carry out the training.

The present depot centres with the amounts estimated as probable expense in railway fares are as follows:

Peshawar	...	Rs. 3,000
Rawal Pindi	...	" 2,000
Jhelum	...	" 2,000
Mean Mir	...	nothing
Multan	...	" 5,000
Sialkot	...	nothing
Jullundur	...	do.
Ludhiana	...	do.
Mardan	...	Rs. 1,000
Kohat	...	" 3,000
Edwardesabad	...	" 4,000
Dera Ismail Khan	...	" 5,000

	Total Rs. 25,000
Present reserve allowance	" 11,880

Total Rs. 36,880

Besides this, there would be a further saving of Rs. 1,000 for fares of instructors. I have allowed nothing

I propose to expend this† amount as follows.

3 Reserve officers on Rs. 400 staff,	
and Rs. 135 office allowance	... Rs. 1,605
2 Asst. reserve officers on Rs. 200 staff	" 400

Total per mensem	Rs. 2,005
per year	Rs. 24,060

* viz. Kohat, Jhelum, Amballa.

† A form showing the expenditure is attached at the end of the

TRAINING OF THE NATIVE INFANTRY RESERVES IN THE PUNJAB 170

For care of arms I think one pensioner per 100 sets of equipments, arms &c., on Rs 5 per mensem would be sufficient.

This would allow—

For 2,160 reservists at Rawal Pindi, and distributed between Rawal Pindi and Peshawar	22 pensioners
For 3,564 reservists at Mean Mir and Sialkot	36 „
For 1,396 reservists at Ferozepore	14 „

	Total	72 pensioners
72 pensioners at 5/-per month	... Rs.	360
per year	... „	4,320 „
3 Asst. reserve officers at Rs. 200/-for 2 months	... „	1,200 „
Staff of permanent officers	... Rs.	24,060
Offg. officers	... Rs.	1,200
Pensioners	... Rs.	4,320

Total Rs. 29,580

The staff of native ranks would be—

3 Subadar-Majors at Rs. 50/-	... Rs.	400
3 Jemadar Adjutants at Rs 17/8/	... „	140
2 Pay Havildars at Rs. 5/-	... „	360

Total Rs. 900

Followers—

2 Sweepers at 5/-	Rs.	360
44 Langris at 7/-	„	1,008
44 Bhistis at 7/-	„	1,008

Total Rs. 2,376

Besides these expenses a small permanent drill staff would be required.

Total expenses	... Rs.	29,580
Staff of native ranks	... „	900
Followers	... „	2,376

Total Rs. 32,856

This leaves a balance of Rs. 4,024 for contingencies not at present allowed for in this scheme.

The castes have been taken from the caste returns in Vol. II, but I believe that there are about 12 more Rajput companies and 12 less Manjha companies. This however will make no material difference to the scheme.

No compensation for rations allowed.

The principal centres will be—

Bawal Pindi.

Mean Mir.

Ferozepore.

Out-stations permanent—

Peshawar.

Sialkot.

Out-stations temporary—

Kohat.

Jhelum.

Amballa.

No passes need be given to men in the Peshawar, Rawal Pindi, Sialkot, Mean Mir, Ferozepore, and Ambala districts. This alone will save a large amount of work.

The passes for other districts can be sent by post or by Civil Officer ; but the easiest way would be to give each man his pass for next year, when this year's training is completed. If he loses it, he pays his own way from his home. In case of mobilization, each man would have his pass ready and valid at his centre at once.

For men living in the above districts, I should like to have a road allowance, so that they could join by road or rail, whichever they preferred.

My object is to reduce work, and have a simple system for training and mobilization, and I think this one will be so.

I will give an instance of what I mean.

Supposing the 24th Punjab Infantry is ordered to go to the front and the reservists are required to join it. They are at present in the 22nd P. I. at Multan, and then have to be sent to the 24th P. I., wherever that regiment may then be. That is, the reservists from Peshawar have to come first to Multan. If the 24th Punjab Infantry goes to Quetta, this is all right, but suppose the 24th Punjab Infantry goes up the Khyber, a lot of delay would take place. I think if, when 24th Punjab Infantry were ordered to go to the front, three telegrams were sent to the three head reserve officers, with orders to send reservists to a certain place, they would arrive there much quicker under this system.

If war broke out, and mobilization was likely to be required, three assistant reserve officers would be required at Peshawar, Jhelum, and Amballa.



ECONOMY IN THE MANAGEMENT OF THE SOLDIER'S RATION.

By **LIEUTENANT-COLONEL J. R. MECHAM**, COMMANDING 2ND
BATTALION SCOTTISH RIFLES.

The following paper is addressed specially to officers commanding companies and to colour-sergeants.

—————:o:—————

1. THE Grocery Ration, for which the Soldier pays 9 pie a day, is as follows :—

Tea, $\frac{1}{2}$ oz., or Coffee, $1\frac{3}{4}$ oz.
Sugar, $2\frac{1}{2}$ oz.
Salt, $\frac{3}{4}$ oz.
Rice or Flour, 4 oz.
Vegetables, including Potatoes, 1 lb.

2. The above quantities of Tea or Coffee, Sugar, Rice or Flour, when considering a number of men above seven, are much in excess of requirements. If the excess is saved and sold, the necessary quantities of Biscuit, Milk, Mustard, Pepper, and extra vegetables, can be purchased without any additional charge to the Soldier.

3. A Table is appended for information and guidance, which shews the quantities required for any number of men for any number of days.

1st Example.

4. A Company of 80 men in mess drawing the Commissariat Ration of Tea, Sugar, and Rice. The daily surplus and its value would be as follows :—

	lb.	oz.		a.	p.		Rs.	a.	p.
Tea,	1	7	sold at	5	6	per lb	0	7	11
Sugar,	1	4	...	2	1	...	0	2	7
Rice,	20	0	...	0	$8\frac{1}{2}$	...	0	14	2
Total Rupees.							<hr/> 1 8 8 <hr/>		

For a month of 30 days the sum of Rupees 46—4—0 would be realized, and available for extra messing. This amount is equivalent to a stoppage from each man of about 3 pie per day.

5. Under the head of cooking the Soldier is charged about 5 pie a day or 12 annas a month, so that for 80 men the sum available is Rs. 60.

The following scale of cooks and wages is necessary for 80 men :—

4 Cooks at Rs. 6	...	...	Rs. 24	0
5 " " 4	...	...	" 20	0
Jemadar Cooks 2 rupees per Company	...	...	" 2	0
Bazaar Tax	...	...	" 1	0
Total Rs.				47 0

So that the balance, Rs. 13 per month, is available for extra messing.

6. Adding Rs. 13 to Rs. 46—4—0 saved on the ration, the total reaches Rs. 59—4—0 per month or Rs. 19½ pie per day for daily expenditure, a sum equivalent to a stoppage of 4 pie per day.

7. For Rs. 1—15—0 the following quantities of mess can be supplied :—

* Or nearly 1 of a lb. extra vegetables per man; not however necessary, if good supervision is established in the cook house.	* 15 lbs. Vegetables at 6 pie	Rs. 0
† Sufficient for 3 meals.	† 8 qts. Milk at 2 annas	" 1
	Mustard and Pepper	" 0
	1 Biscuit per man per day, for early morning tea,	
	at 1 anna for 12	" 0
Total Rs. ...		1 1

2nd Example.

8. If flour is drawn instead of rice, the amount realized will be increased by 3 annas 4 pie a day, as flour sells at 19½ pie.

3rd Example.

9. If coffee is drawn for 80 men, the surplus after each meal is 3 lbs. 6½ oz. at 9½ annas a lb.;—realizes 2—0—2 or Rs. 1—8—3 more than the surplus tea.

4th Example.

10. If coffee and flour are drawn instead of rice, the amount per month available for extra messing will be as per paragraph 6—Rupees 59—4—0 plus Rs. 5—11—6 equal to Rs. 110—15—6 per month, equivalent to a daily stoppage of about 1 anna 2 pie per day per man.

5th Example.

11. If coffee is drawn and sold, it would realize Rs. 4—3—8, that is 7 lb. 2½ oz. at 9 annas 6 pie a lb.

The surplus tea from two companies, each 80 men, purchased (at 6 annas a lb.), would be more than sufficient.

about 10 oz. The company selling coffee and buying tea would gain (about Rs. 3—6—8 a day) on the transaction, and the companies selling surplus tea would also gain.

—o—
NUCLEUS IN MESSING FUND.

12. In order to establish a nucleus for extra messing in companies, the As. 3 per month charged under heading "Basin Fund" should be under heading "extra messing," and the As. 2 per month recently saved by the reduction of stoppage under head of "washing", should also be shown under head of extra messing; also by para. 5 it is shown that As. 10 per month is sufficient for charge under the head of cooks.

The Soldier's account should therefore read as follows:—

Rs.	A.	P.	
1	6	6	Govt. Grocery stoppage for 30 days @ 9 pies
0	10	0	Cooking.
0	10	0	Dhobie.
0	7	0	Extra messing.
<hr/>			
Total Rs. 3	1	6	

Instead of as at present:—

Rs.	A.	P.	
1	6	6	Govt. Grocery Ration.
0	12	0	Cooking.
0	12	0	Dhobie.
0	3	0	Basin Fund.

Total Rs. 3 1 6

It will be observed that the stoppage is not increased, but the sum of As. 7 per month per man is available for extra messing, in addition to what may be realized by any of the foregoing examples of what can be gained on surplus Ration. For instance take example No. 5, where if the coffee drawn for 80 men is sold and tea bought, the company would have for extra messing,

	Rs.	A.	P.
Rupees	...	3	6 8
Extra messing stoppage	...	1	2 0
20 lbs. of flour	...	1	2 4
Sugar	...	0	2 7

Total Rs. 5 13 7 a day.

13. Basins, Table Cloths, &c. will in future be kept up by regimental funds, but officers commanding companies must be

careful to ensure that all breakages or damage not attributable to fair wear and tear are charged to individuals.

14. The scale of extra vegetables, milk, &c., noted in the last example is sufficient for 80 men, so that if the Rations are drawn up according to any of the last four examples, the amount available will admit of expenditure on butter or jam, cheese, and offals to the full extent required, and in addition messing books would run for a year.

Butter can be purchased at 8 annas a lb. Jam at 5 annas a lb.

Beef Offals can be purchased as follows :—

	a.	p.
Head with Tongue each	3	6
Do. without " "	2	3
Brain " "	0	6
Tongue " "	1	3
Liver " "	2	0
Heart " "	1	0
Tripe " "	1	6
Feet " "	0	6
Suet lb.	4	0

MUTTON OFFALS.

Head and four feet each	1	6
Liver " "	1	6
Tripe " "	1	0
Fat lb.	4	0

15. Cows are fed and milked under European supervision daily at the Ration Stand.

Extra vegetables and butter are inspected daily at the Ration Stand, and also offals.

Pepper corns should be bought in the bazaar.

Mustard and biscuits, jam &c., should be obtained from the coffee shop.

16. In order to ensure that no part of the surplus is made away with by the cooks, it should be deducted and accounted for at the Ration Stand. The cook's orderly will see that the deductions noted in the ink on the indents are received by the bunyah, and will sign for the amount, the bunyah or person that buys to be accounted for at the end of each month.

DUTIES OF SOLDIER COOK.

1. He should be selected from the men who have received prizes for company cooking prizes.

2. The cook house is to be opened daily one hour after reveille and thoroughly cleaned. The cook's orderly will see that once a week he reports his visit to the commanding his company.

* This pamphlet was written at Jubbulpore.

3. He will muster his cooks daily half-an-hour before the Ration-call, and see they are clean and in possession of clean cloths to use in the cook house.

4. Cloths should be supplied by companies from messing funds, and washed by company dhobies.

5. He will attend daily at the Ration Stand and draw the Rations, and with the orderly corporal see that the surplus of coffee, tea, rice, flour, and sugar, as shown in table, is signed for by the person who buys it.

6. He will superintend the cutting up of the meat ration, allotting the proper proportions of meat and vegetables to the different messes.

7. He will see that the refuse scraps, bones, vegetables, &c. from the cook houses, and also from the mess tables, are placed in the scrap kettles, and disposed of under the orders of the captain of his company.

8. He will under company arrangement receive all articles of extra messing, and personally see that they are issued in proper proportions to the various messes.

9. He will retain in a locked receptacle, tea, sugar, and articles of messing, and issue as required.

10. He will occasionally check the wood ration, and see that it is not wasted.

11. He will see that the cooking utensils are cleaned at retreat, when the cook house will be closed, and the key kept by him. The kettles should be cleaned once a week with wood ashes and lime juice under his supervision.

12. He will not permit any man to enter the cook house, and will at once report any irregularity on the part of the cooks, or on the part of the men towards the cooks.

13. He should bear in mind that unless he carries out his duties with energy and judgment, his comrades will not receive the full benefit of their Rations.

14. Refuse from tables and cook houses should be collected, and sold under company arrangements.

15. Company staff of soldier cooks are to be exercised once a quarter in cooking the Rations.

PAYMENT OF COOKS AND BOYS.

1. Cooks and boys employed are to receive their pay at the pay table monthly, and in the presence of the cook orderly, who will vouch for their conduct during the month to the officer paying them.

2. As the strength of companies fluctuates, so should the number of natives employed; the soldier cook bringing to notice when an increase or decrease in establishment is required.

3. When it is necessary to discharge or engage it is to be done through the jemadar cook, as he is responsible to the commanding officer that fit and proper persons are in the lines.

GENERAL REMARKS.

1. It is not intended that the messing books should be on credit, except perhaps by general consent of the mess. The purpose of meeting outlay for any special meal such as a year's dinner.

2. Officers commanding companies will see that the surplus gained by sale of surplus rations etc. on any particular day is expended in extra messing on the same day. For instance, if a surplus is gained on the 1st of March, the amount expended on the 1st should also be about Rs. 5-9-8, otherwise the improvement in the messing is not advantageously carried out, and the company does not receive the full benefit of the scheme.

3. The persons who purchase surplus Ration are required to pay the officer commanding the company on their being presented with a bill for the same.

4. Surplus is not to be sold to any one, except to the company shop or to the bunyah appointed by the commanding officer.

Number of Men.

1 Meal.

lbs. oza. lbs.

1	$\frac{1}{4}$	
2	$\frac{1}{2}$	
3	$\frac{3}{4}$	
4	1	
5	$1\frac{1}{4}$	
6	$1\frac{1}{2}$	
7	$1\frac{3}{4}$	
8	2	
9	$2\frac{1}{4}$	
10	$2\frac{1}{2}$	
20	5	
30	$7\frac{1}{2}$	1
40	10	1
50	$12\frac{1}{2}$	2
60	15	2
70	1 $1\frac{1}{2}$	3
80	1 4	3
90	1 $6\frac{1}{2}$	4
100	1 9	4

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A GEOGRAPHY
OF
THE TURKESTAN COUNTRY.

(With a short account of the Khanates of Bokhara and Khiva,
and the Transcaspian province).

With a map of the country.

Translated in the Intelligence Branch of the Quarter-Master-
General's Department in India.

BY
STAFF-LIEUTENANT E. PEACH, I. B.

COMPILED BY
N. V. OSTROUMOFF.

(First Edition approved by the learned Committee of the Ministry of Public Instruction for use in the Government Schools of Turkestan, September 1886.)

Samarkand.

1891.

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CHAPTER I.

THE BOUNDARIES AND THEIR SIGNIFICANCE TO THE COUNTRY.

Turkestan is bounded on the north by the Turgai and Irtys provinces. The boundary commences from the centre of the Gulf (in the northern part of the Aral sea), and crosses the Termanbess to the post station of Terekli, whence it runs to the south-east, follows the shore of lake Saumal-kul and reaches the Chu to its left tributary the Kuragata.

The eastern boundary, separating our country from the province of Semirechia and the Chinese Empire, cuts the Alatau range, the Susamir mountains, the Ferghana or Uch-sait mountains, and Trans-Alai, and on the Pamir plateau reaches as far as the Bel pass near lake Rangkul.

The southern boundary (which is also the southern limit of the empire) separating the country from Bokhara, stretches from the Uzbel pass on the east over the Pamir plateau, around the Fedchenko glacier, cuts the Trans-Alai mountains, the Kizil Su river, and thence following the Alai and Hissar mountains takes a direction towards the mountain Ak-tau. From there it is continued in a north-westerly direction across the Kizil Su desert to the Oxus.

The Amu Daria or Oxus forms the western boundary. Towards the mouth the boundary is formed by its western delta, the Taldik, and the Aral sea. The Oxus, which in our territory has a length of 500 versts (331 miles), separates our dominions from those of the Khan of Khiva.

These boundaries are important both in a commercial and military sense. In the first case because they are cross-roads for imports and exports in our trade with the neighbouring countries, and in the second, because they first of all are liable to be attacked by an enemy. We will therefore proceed first to consider the frontiers on which the country is co-terminous with other countries.

The frontier of China (on the east) is in a military sense considered safe, as it is defended by the lofty range of the Shan mountains and its branches passing through the Altai, Osh districts; in addition to which between us and China lies the desert of Gobi, in which warlike operations are impossible. Therefore in this direction only the fort of Gulcha commands the main roads from Kashgar and the Pamirs.

In a commercial sense this frontier is more important, as by it we supply the inhabitants of Kashgar to the west with a large sum of money with manufactured and metal goods, and receive from them different kinds of raw material and silk for which reason we have here customs offices at certain points.

The boundaries towards Bokhara and Khiva are not dangerous in a military sense, but in a commercial they are the most important of all our Asiatic frontiers, and on this account we have here a regular series of custom house points. Along the southern boundary passes the most convenient route into Europe—the railway—by which are exported raw materials in the shape of cotton, silk, hides, wool, and dried fruits, and imported almost every production of European Russia, from needles to machines and valuable gold manufactures, and from the cheapest calico to gold brocade. Besides all this Turkestan receives by this route her light in the shape of petroleum, and building materials from the Volga, such as beech, pine, and oak planks and beams.

Across these boundaries in an irresistible stream flows also the tide of civilization to the uttermost parts of Central Asia. The borders in the interior of the empire have only an administrative significance.

CHAPTER II.

CONFIGURATION OF THE SURFACE OF THE TURKESTAN COUNTRY.

The whole country may be divided into two unequal in size and widely differing parts, viz :—

(A) THE NORTH-WESTERN.

(B) THE SOUTH-EASTERN.

A. The north-western portion, which includes the Syr Daria and

The north-western Amu Daria rivers, is really little more than a vast desert mostly of sand and salt-impregnated clay. In such localities there is very little water, and rain falls but seldom ; in summer the heat is frightful and the cold in winter excessively severe ; the wind sweeping freely over these extensive plains heaps up the sand into masses (called Barkhans), or scatters it in the air in the form of sandstorms (Burans), which almost darken the light of the sun and cover up all wells and canals, and, even at times, living creatures and caravans.

When these storms happen in winter and snow rises with the sands, woe to every living thing! These blizzards, in a severe frost, rage with terrible effect ; human beings and animals overtaken by them lose their heads, and often perish within a few yards of their dwellings. The cattle flee with the wind, and sometimes so impetuously that it is impossible to stop them, and sometimes they fall over precipices and are killed. Such phenomena appear often in these parts of the country. These sandy steppes are indeed an awful wilderness.

Of the vegetable kingdom are to be met with the *wormwood*, the "*julsan*" with its fleshy leaves; the "*chi*" thrusting up its slender stems through the sand; *thorn bushes*, and on the shores of the lakes *reeds*. In these parts of the country are many salt-lake beds. These present a still more dreary appearance; in the desert is, at any rate, some sort of vegetation to be met with, but the impregnated plains are utterly bare save for a few blades of grass. For this reason the former, at certain times of the year, swarm with Kirghiz nomads, while the latter are always desolate.

Amongst the saltbeds are to be distinguished the *Yaks*, which all the year round form an impassable swamp, and the *Sors*, dry. The dry are of two kinds—"Sors" (lit. dust, light), a brittle, friable soil, and "*Takirs*" (with a hard, brick-like crust).

After even a small fall of rain both these kinds of saltbeds turn into deep mud and present a very considerable obstacle to communications. The pooriness of nature in these parts, however, is at the Syr Daria and Amu Daria rivers, on the banks of which lie strips of arable land.

B. The south-eastern and smaller part of the country is characterized by being covered with lofty mountain ranges. The south-eastern portion generally. branches, in which are many fertile and beautiful valleys suitable for cultivation. The mountains here attain a very considerable altitude—viz. 20,000 feet. The summits of such masses are of course crowned with snow, and the foot of man has not trodden them; indeed, it is rarely that the highest peaks can be seen by reason of the clouds which envelope such giants. In the mountainous regions masses of ice collect and form glaciers, in which all the rivers of the country have their sources.

In the mountain valleys are to be found the aboriginal inhabitants of the country. As in the north-western portion the occupation of the inhabitants is cattle-raising, in the south-east it is agriculture and gardening. In the valleys the winter is not so severe, and in places there is no winter at all. Here also is to be met with a great variety in both the animal and vegetable kingdom.

Examining the south-eastern portion in detail we observe that the South-eastern portion in detail. it is full of mountain ranges and their branches and offshoots. In general the ranges are the continuation of the Tian Shan mountainsystem, which extends to a height of 21,000 feet above the level of the sea. Coming from the heart of the Chinese Empire the Tian Shan runs in the direction of Lake Issik Kul (Semirechensk province). From this point divide up into separate ranges and branches bearing different names.

Let us consider the Tian Shan mountains in our territory.

To the east of Lake Issik Kul the Tian Shan are divided into two parts. The part which borders the lake on the north is called Kungé-ala-tau, and that stretching along the south retains the name of the Tian Shan. The furthest continuation of the Kungé-ala-tau, in the Aulia-áta district, appears under the name of the *Alexandrovsk* mountains.

(1). The Alexandrovsk range commences from the Buam defile and ends in the Aulia-áta district. Its length is about 400 versts (266 miles), average height 10,000 feet. The highest part is that opposite Pishpek, where it reaches to 15,000 feet, and is covered with eternal snow; on the other hand as it approaches the town of Aulia-áta the chain gets lower. Thus in the neighbourhood of the fortifications of Merké it has a height of 9,000 feet, while the western extremity, the "ness" or cape of "*Tek-turmas*", near Aulia-áta, is only 2,000 feet high.

The northern slopes and valleys of the range are covered with coniferous forests, the southern being bare of trees. The following shrubs are met with:—
Natural productions. juniper, black currant, and a briar with yellow flowers; of trees (besides the fir) grow the juniper tree, mountain ash, birch, willow, and poplar. The mineral wealth is not yet explored. Of animals the deer, wild sheep, wild goats, boars, and porcupines abound.

The passes are not of very great height, and all mountain valleys are covered with excellent grass; the mountain poppy and peony grow up as far as the snow line. The rich pastures enable the Kirghiz to keep large flocks and herds.

There are two passes known, the Karakul and Utmek; the last named leads into the valley of Ferghana.

The Alexandrovsk range at its highest point is connected towards the south with numerous smaller ranges bearing different names, so that the whole of this part right up to the Ferghana valley and the Tashkend district is one irregular mass of piled up mountains. The following are some of these smaller ranges:—

The *Susamir* mountains.

Talas and *Chatkal Ala-tau*.

Mogol-tau.

Kara-tau.

The Ala-tau are situated in the south of the Aulia-áta district parallel to the Alexandrovsk mountains. Beyond Chakpak (Chimkend district) they are connected with the Kara-tau.

The Ala-tau mountain system.

(a). The *Talas* Ala-tau (the centre of the Urtak-tau mountains bounding the Aulia-áta district on the north) have a length of 300 versts (200 miles). The highest peaks are 13,000 feet and covered with snow. Up to the snow line these mountains are covered with the richest grass lands, and together with the Alexandrovsk region form the celebrated "*Tulas*" valley, renowned throughout the country for its fertility and temperate climate.

(b). The *Kara-tau* run from south-east to north-west. They have a total length of 350 versts (230 miles). The highest peaks, as for instance "*Min*" (the highest peak), opposite to the town of Turkestan, are not more than 7,000 feet. These in summer are bare of snow, whence the mountains received their name of Kara or "black" mountains.

Branches of the Kara-tau are :—

Western.—"Kara-turun," very gentle in slope.

Eastern.—"Bolordai" (5,000 feet), rocky and steep.

Branches of the Ala-tau :—

Kasikurm (on the west, 4,000 feet). This is the highest peak of the natives. According to their tradition it was on this peak (opposite to the post station of Bekliar-bek) that the mountains were grounded after the flood.

Passes.—In the Ala-tau :—

Kara-bura.—Leading into the Ferghana valley and the Chatkal river.

In the Kara-tau :—

Tarlan and *Badoki*, with roads to the towns of Tashkent and Troitsk.

Although the Ala-tau and Kara-tau are inconsiderable in

Natural productions of the Ala-tau and Kara-tau. matter of height, they nevertheless contain many minerals. There are gold, silver, iron, copper, and coal and marble found. The mountain defiles of Karakoin, Ur Maral, and (all in the Ala-tau) are covered with pine forests and poplars, fruit trees, cypresses, creepers, hawthorn, and higher trees. In addition to this pine trees grow on the north and on the southern stunted juniper trees.

The valleys are well watered and possess a dark fertile soil. For this reason agriculture and cattle-rearing are well developed in them.

(c). Parallel to the course of the river Chatkal and

Chatkal Ala-tau. left bank runs the fairly lofty range of the Chatkal Ala-tau. This takes a south-west direction, and ends in a number of branches which cover the eastern portion of the Tashkend district under the name of the Kurama mountains.

The Chatkal Ala-tau mountains, which serve to form the northern boundary of the Ferghana valley, also spread out other branches against the Kokand and Namangan districts. The length of the range is about 300 versts (200 miles); separate peaks rise to a height of 17,000 feet and are covered with eternal snow. On this account (and the same thing applies to the Talas Ala-tau), a large number of rivers and rivulets take their rise in these mountains, and water not only the whole of the Tashkent, but also the northern portion of the Namangan, district.

The Chatkal Ala-tau has the following practicable passes :—

Afliatun, Chanash, Chapchama, by which in the summer months passes a brisk stream of commerce through the town of Aulia-áta with Siberia, and what is of still greater importance, these passes form the shortest and best routes for the nomads to drive their flocks and herds from the steppes in the north and north-western parts of the country into the Ferghana valley. These mountains are very picturesque. The valleys and ravines are clothed in summer with various grasses which attract hither all the nomad population of the neighbouring districts. In the hottest part of the year the herds go high up the mountains in order to escape the heat and obtain pasturage. On the southern slopes grow fine timber trees, which are floated down the Syr Daria to Khojend and Kazalinsk, and these mountains are also noted for the fruit growing wild on them. To what extent they are rich in metals is not known (though the natives find gold on the river Chatkal), but the branches of this range in the Ferghana province abound in minerals such as moom, petroleum, and coal.

(d). The branches of the Chatkal Ala-tau, breaking up near the station of Murza Robat, give off a small chain of about 30 versts (20 miles) in length called the *Mogol-tau*. This chain follows the right bank of the Syr Daria opposite Khojend, and forms in the river the “Begovat” rapids, which prevent the passage of vessels into Ferghana from Chinaz.

The *Mogol-tau* having their southern slopes directed towards Khojend retain the heat very strongly, and render the temperature of that town almost unbearable in summer. These hills are treeless and snowless.

(e). The Tian Shan, when it reaches the Chadir-kul lake, gives off the *Uch-sait* or *Ferghana* range in a north-westerly direction. This latter stretches as far as the Narin river and protects the Ferghana valley from the north-east. It also forms the boundary between it and the province of Semirechia.

The Tian Shan mountains attain to a height of 13,000 feet. Many of the passes are 11,000 and therefore difficult of access. The outlying ranges of

Uch-sait or *Ferghana*
mountains.

Tian-Shan.

these mountains, which fill the Ferghana valley, abound in gold and petroleum, and in the Andijan district, in sulphur, both hot and cold. The mountains are of a rugged character, and give rise to a large number of small rivers flowing partly into the Kara-daria and partly into the Narin.

2. To the south of the Ferghana valley is another range of the Tian Shan, the majestic *Alai*.

The *Alai*. These commence at the Suek pass (Chadir-kul) on the east, and stretch right away to the glacier on the west, thus separating our dominions from the east and Karategin on the west. The range is 400 miles in length, in a direction north-east to south-west. The height 12,000 feet, separate peaks over 18,000. The highest of the ridge is near the Zerafshan glacier.

The most important *passes* are:—

Taldik (11,000 feet), leading into the *Alai* valley, *dawan* (12,000 feet), leading to Kashgar. The remaining are only suitable for single travellers and not for caravans.

The *Alai* serves as the water parting between the Syr Daria and Amu. Its snows

Rivers in the *Alai*. to many of the rivers of the Ferghana, such as the Kara-daria, Naukat, Isfara, Sokh, Shah-i-nar, and others.

On the northern slopes grow the juniper tree, the fir, beech, mountain ash, mountain cedar, honeysuckle, currant bush, bayberry, &c. The fauna consists of bears, wolves, and wild sheep. The only minerals as yet known on the mountains are petroleum, sulphur (springs), and coal.

3. Beyond the *Alai*, across the valley of the Kizil-At-Beg, is the even more majestic range of the *Trans-Alai* mountains.

They run from north-east to south-west, and are half the length of the *Alai*. In the eastern portion they are impassable, the centre are not less than 18,000 or 19,000 feet, while to the west they are intersected by a large number of defiles. The eastern slopes of the chain are covered with one mass of snow; in the western separate peaks are snow-covered. In this range are some of the most

Peaks. mously high mountains; among the most known being Peak Kaufman 23,000, and Kizil-agi 22,000 feet.

Passes. There are the following *passes*:

Tau-murun leading to Kashgar.

Ters-agar leading to Karategin.

The eternal snows give rise to many rivers flowing into either the Kizil Su (a tributary of the Amu Daria), or lake Kara Kul.

These rivers, flowing down a very steep gradient, are not navigable.

Natural productions.

The animal and vegetable products are the same as those of the Alai mountains with the exception that martens are found on the upper reaches of the river Muk Su.

On the southern slopes the Kirghiz of the Alai and nomads from Karategin wash gold in the channel of the Sauk Su (a tributary of the Muk Su), which takes its rise from Peak Kaufman.*

4. South of the Trans-Alai mountains lies the lofty plateau of the "Pamir Khargosh" or simply "Pamir" with the lake of Kara Kul, the largest in the

The Pamirs.

whole country after the Aral sea. Its water is salt and bitter.

The extent of the plateau is about 10,000 square versts (4,400 sq. m.), and the average height 13,000 feet, for which reason it is called by the natives "the roof of the world," *i.e.*, Bám-i-dunya" or "Pamir." On it are the frontiers of our empire with China and Afghanistan.

Here also, at the source of the river Selsei, is the first class glacier *Fedchenko*. It runs north and south,

Glaciers.

and east and west runs another glacier

Tanimas.

The length of the Fedchenko glacier is about 30 versts (20 Fedchenko and Tanimas glaciers. miles), and the breadth from 1 to 3 versts (1166 yds. to 2 miles). The Tanimas in the valley of the river Balyand-Kyek forms a wall of ice about 30 sajenes (210 feet) high. From this the mass of ice collected here may be judged. All this part of the country (the Pamirs) is remarkable for glaciers.

At the western extremity of the Zerafshan glacier three chains of mountains meet. Radiating to the west in three different directions they bear the following appellations :—

The northern is called the *Turkestan* range, the centre the *Zerafshan*, and the southern the *Hissar*.

All three attain their greatest height near the Zerafshan glacier. All this mountain region is known to the natives under the name of *Kohistan*.

*Note.—The manner of this washing of the gold is extremely primitive. A round wooden frame covered with common carpet serves as the washing utensil for the gold-bearing sand. This sand or earth is brought and deposited on the carpet, and water is poured over it; it is then stirred with the finger. After long washing and throwing away of the larger particles of sand very tiny grains of gold are found on the carpet, which are collected. Two men working in this way will obtain from 20 kopeks to 3 roubles worth of gold in a day.

This glacier runs east and west, and is connected with side glaciers such as the *Rama*, *T*
Zerafshan glacier. others. Its length is 56 versts (The whole surface is covered with ice cones of every size. North of this glacier is the *Shurorsky* glacier; them are less than 11,000 feet above sea level. All the rich in glaciers, which are important as forming the the rivers which water the Zerafshan and Ferghana valleys. The mountains discussed earlier are poor in respect of glaciers).

The Turkestan range stretches from east to west, near as the *kishlák** of Urmitán, where
Turkestan mountains. into two branches; one of the ends in some small hills near the town of Panjkend, is the "Chumkar," and the other or northern branch, up to the defile (through which passes the road from Jizak to Yul and Samarkand), bears the name of *Malguzar*, and bears the point that of "*Nurashin*".

The Turkestan range is 280 versts (187 miles) long. It (westwards from the Zerafshan glacier) is always covered with snow (the Chumkar are snowless). The passes are 10,000 feet, and consequently difficult. The northern slopes are steep, and in places slope down to the Syr Daria; on the south are juniper woods and rich pasture land, and coal is found in the Khojend district. The southern slopes are precipitous and have little vegetation. This range forms the waterparting of the Syr Daria and Zerafshan rivers.

The Malguzar (the northern branch of the Turkestan range) are only high hills, and form an excellent summer dwelling place for the natives.
Malguzar.
 at the Jelán-ut gorge.

The direct road from Kokand, Khojend, and Tashkent to Samarkand lies through the Jelán-ut defile.
The Jelán-ut defile. This defile should rather be called a valley. There are no very striking views in it, though in places narrows to as little as 40 sajenes (90 yards). There is a monument in it called "*Tamerlane's rock*," made of slate, and now almost in ruin. On it, at the height of about 100 feet from the ground, is a Persian inscription telling of the death of Abdullah Khan over the Kipchak and other tribes. On this rock the defile is also called "*the gates of Tamerlane*".

From here the mountains are known by the name of Nura-tau, and abut on to the Kizil Kum range.
Nura-tau. Nura-tau range is about 200 versts (130 miles) long and 24 (16 miles) broad, and ends near the

* *Kishlák* means really the winter quarters of a nomad race, but is used simply as a term for a village or settlement not worthy of the name of a town or city.
 Trans.

fortress of Nurata in the Bukan hills. The height is below the eternal snow line.

The nature of the soil enables the inhabitants of the valleys in these mountains to engage in agriculture. Fertility in the Nura-tau. Corn grows without artificial irrigation. There are numerous villages and settlements, the inhabitants of which communicate by means of good passes and numberless tracks and paths.

From the Nura-tau to the south spring two branches, the *Karacha-tau* and *Ak-tau*, both bare and rocky; Branches of the Nura-tau, and heights in the Kizil Kum. and in the desert of Kizil Kum are the following rocky heights:—*Kizak-tau*, *Arslan-tau*, *Tokhta*, *Karak*, *Altin*, and many others.

The Kizil Kum mountains consist of sand, schist, ochre, and gypsum, and some of them, as for instance the *Altin-tau*, contain metals. Besides this these mountains are the guardians of the desert. The sandstorms break on them, and in their shelter are grass covered plains, without which it would go hard with the herds of the nomads.

The Zerafshan range runs in the same direction as the Turkestan (right up to the kishlák of Jam) about Zerafshan mountains. 300 versts (200 miles), and finishes with a height of 2,000 feet. Up to the river Var the range is above the eternal snow line. The passes are from 11,000 to 14,000 feet. This range forms two thickly populated valleys, viz., those of the rivers Zerafshan and Yagnab Daria. Along the western branch of the range lies the imperial boundary.

5. The Hissar range, being a continuation of the Tian Shan, has a great altitude, and is one of the most important ranges in the country. Starting from the Zerafshan glacier in a south-westerly direction, it stretches 400 versts (266 miles) to the neighbourhood of the town of Guzar (in Bokhara), where it splits up into numerous branches reaching as far as the right bank of the Amu Daria. Most of its length it is above the snow line, having an elevation of from 16 to 18,000 feet, and near the Zerafshan glacier even more. There are two passes known:—the *Pakshif* and *Mura*, height 12,000 to 15,000 feet. The Hissar forms the waterparting of the Zerafshan and Kizil Su rivers.

The northern slopes of all these ranges (the Turkestan, Zerafshan, and Hissar) are generally easy and covered with vegetation, while the southern are short, steep, precipitous, and bare. In the valleys running at right angles to the main ranges there are juniper and larch woods, and in the neighbourhood of Lake Iskander Kul also birch. There is little building timber.

The animal kingdom is represented by bears, wolves, foxes, marmots, polecats, martens, and, rarely, panthers. Of birds, the

mountain partridge, the plover, and bustard are met with. Fan and Farab are found alum, sulphur, iron ore, and in the upper parts of the Zerafshan river gold.

Near the upper part of the river Var the Hissar range off a branch (*Dukdan*) to the west which fills up the space between Var and Iskander Daria. Here is the peak of *Chabdara*, 18,300 feet high. Towards the north it gives out three more branches, which surround Lake Issyk-Kul and form the mountainous tract of Maghian, serving at the same time as the watershed of the tributaries of the left bank of the Zerafshan.

Between the kishláks of Maghian and Urgut there are groups of mountains called Hazrat-i-Sultan. This group is particularly respected by the natives on the foundation of a tradition that a holy man, Hazrat-i-Sultan-Khodja-Daur, once took refuge here and lives there still. To the west of the Hazrat-i-Sultan is the Shahr-i-sabz valley, the birth-place of Tamerlane.

The Hissar range forms our southern boundary with Persia.

THE NORTH-WESTERN PORTION OF THE COUNTRY

Having completed our inspection of the south-eastern portion of the country, we come now to the description of the north-western portion in detail. Here that the Syr Daria flows across less sandy or salt-impregnated clay steppes. These differ in different parts and according to their various peculiarities have different names.

1. The northern portion of the Kazalinsk and Perovsk provinces as far as the mouth of the river Syr Daria. The right bank of the Syr Daria is called "*the Kara Kum sands*". The surface is undulating and covered with sand heaps, *barkhans*, (see page 183); moving sands are met with, and in such parts the ground is bare and unproductive. In different parts of the steppes are salt and clay exposures, exist, and in sandy soil the water is good, but in clay soil the water in most of the wells is salt and bitter.

Of the vegetable kingdom on the Kara Kum sands there is little. The wood, "*chi*," bitter grass, and saxaul are the principal plants. For this reason the Kirghiz find it a very barren and sterile place, as the snow is not deep and the cattle easily find food from beneath it, and the saxaul supplies them with food.

2. The continuation of the Bedpak-dala steppe, lying between the river Su in the Akmolinsk province and the river Irtys. It is called "*the Muyun Kum*" sands. These

over the Chirkend and Aulia-áta districts, being bounded on three sides by the river Su, the Alexandrovsk mountains, and Kara-tau mountains respectively, while on the fourth (the west) they merge into the Kara Kum. This steppe is in the form of a basin with numerous wells and salt lakes. The courses of the rivers Talas, Chu, and Sari Su with their tributaries indicate the lowest-lying part of it.

Distinctive characteristics of the Muyun Kum are, (1) the height of the sand hills (*barkhans*), which here reach as much as 35 feet, and which are covered with a growth of saxaul and "jingal" and, (2) shifting sands. The shores of the rivers and lakes of the steppes are overgrown with reeds to a distance of from 10 to 20 versts.

As the country along the Talas river is considered a good wintering ground by the Kirghiz, the Muyun Kum steppes are, in winter, covered with a number of yurts (huts, encampments).

3. The enormous expanse, of irregular outline, bounded by the Syr and Amu Daria rivers, the Aral sea, and on the east by the off-shoots of the Turkestan and Samarkand mountain ranges and the line Jizak-Chinaz, is called "*the Kizil Kum sands*." In this desert, however, barren

Kizil Kum sands.

Vegetation.

wastes and shifting sands are rarely met with, and the plain is densely overgrown with a particular kind of sedge called "*rang*." The roots of this bind the sands; the leaves afford a nourishing food for small animals, but it is difficult to collect a sufficient supply for the larger kinds of cattle, and consequently sheep-rearing here predominates. Clay soil expanses covered with "*rang*" form excellent pasture lands. In addition to *rang*, bitter grass and other grasses, these sands are covered with enormous saxaul bushes. Owing to the crookedness of its stem rendering it unsuitable for building purposes the saxaul plant is usually burned to make charcoal; this forms the chief occupation of the natives from the banks of the Syr and beggars from below Tashkend.

On the Kizil Kum are many salt-yielding lakes; the poor people collect and sell it in the bazaars of the nearest towns.

Swamps (*batkak*) are met with, over which it is quite impossible to ride owing to the danger of being sucked in and swallowed up. There are many wells with fresh, bitter-brackish, and sulphurous water. The western portion of the desert is more sandy and full of sand hills than the eastern, in which there are more rocky hills. The hills of the Kizil Kum are composed of sand, slate, schist, ochre, gypsum, and potter's clay.

4. The south-eastern portion of the Kizil Kum (bounded by the Nura-tau mountains, Syr Daria river, and the line Jizak-Chinaz, to the south-west of the

Golodnaia steppe.

latter place) is called the Golodnaia (hungry) steppe near the river is marshy, full of hillocks, and with sedge and reeds ; further from the river the soil is dry. As regards the quality of the soil, this is the best steppes ; but owing to the lack of water, as early as the May all the grass burns up and the surface becomes qu the traces, however, of enormous irrigation canals str hundred versts or more, and the remains of ancient se prove that in former times the country was inhabited.

Of the animal kingdom the following represent
 Animal kingdom and climate of the sands. found on the Kara Kum, Muyun K Kum, and Golodnaia :—Wolves, fox hogs, wild pig, antelopes, hares, the marmot, and the shrew.

Of birds :—Vultures, kites (mouse killers and snake falcons, partridges, bustards, doves, larks, bush warblers, morants.

Of reptiles and insects :—

Enormous (to $3\frac{1}{2}$ feet long on the Kizil Kum) lizard tortoises, ants, wasps, cockchafers, scorpions, centipede anes", and "karakurts."

The climate of the above-described deserts, by reason absence of lakes, rivers, and small rainfall, is unusually continental), and the cold is severe in winter.

Burans (tempests), with moving red hot sand in summer mixed with snow in winter, are of frequent occurrence.

CHAPTER III.

Watering of the country ; description of the principal and the rivers by which they are watered.

The huge masses of mountains in the south-east give the two great rivers of the country, the Syr and Amu D their innumerable tributaries. The valleys watered rivers and their tributaries are made fertile, and thus supply for the people inhabiting them.

From the map of the country we observe that there are basins into which rivers empty themselves, viz. the Aral Lake Saumal Kul. Of these rivers, the Chu, flowing on the eastern boundary of the country through uninhabited wastes of particular importance, while the Syr Daria, having a full-volume, and therefore navigable, stream, belonging through almost its entire length, is of the utmost value.

Its banks with their loamy soil await an extensive cultivation.

The Amu Daria, which forms the boundary between Khiva and Bakhara, on the waters of which has arisen the Amu Daria flotilla, and on whose banks are three large towns belonging to us (Kerki, Charjui, and Petro-Alexandrovsk), if not even already, will in the future, be of the very greatest importance.

For this reason we will proceed to examine these two last-named rivers more in detail.

THE SYR DARIA RIVER.

The river Syr Daria is the most considerable and has the largest volume of water of all the rivers of the Turkestan country. It takes its rise in the Tian Shan mountains, in the Issik Kul district (province of Semirechia) in two streams forming, at first, the river *Ayak* (*Yak-tash*?). Meeting, further on, with the river *Taragai* (flowing from the immense "*Petrof*" glacier), it takes that name, and, from its confluence with the *Kara-sai* in the first narrow gorge through which it passes, it is called the *Great Narin*. Further on still, in its course to the south, after receiving a large number of tributaries and passing through the rocky cleft of Chichikta (in the northern part of the Ferghana mountains), in sight of the village of Uch-Kurgan, the Narin enters the Ferghana valley, and from hence, having taken in the river Kara Daria, it becomes the Syr Daria right away to its mouth. From here also it commences to be a deep and broad river.

In the Ferghana province the Syr flows, first 300 versts (200 miles) along the southern boundary of the Namangan district, and from thence enters the Khojend district, separating it from the district of Tashkend.

Here it turns north, and flows through the Tashkend and Chimkend districts; after this it continues its course to the north-west, through the Perovsk and Kazalinsk districts, and, in the last named, empties itself into the sea by three channels, having run, within the boundaries of Turkestan, as much as 1,700 versts (1,133 miles). In the Ferghana province the current of the Syr is swift; it receives a large number of affluents from both sides, and the main channel is deep, but it is not navigable on account of the *Begovat* rapids (see above, page 187), which commencing from about 25 versts (17 miles) from Khodjend continue as far as the village of Begovat, 40 versts (27 miles) from Khodjend.

These rapids not permitting of the passing of large vessels from the mouth of the river, the part of the Syr Daria in Ferghana is only suitable for floating rafts.

There are no fords also in this part, the only means of crossing the river being by boats or rafts (*sals*).

From the fortifications of Chinaz the river flows between precipitous banks; its depth here reaches to several sajenes (1 sajene=7 feet) at the banks; from this point it commences to be navigable.

From the fortifications of Yani-Kurgan the banks are low in spring are subject to floods which turn the neighbouring marsh overgrown with reeds. (This is between Fort No. 1 and the town of Perovsk). Between Chinaz and Perovsk the width of the river is from 120 to 150 sajenes (from 280 to 360 fathoms), depth from 3 to 5 sajenes (21 to 35 feet), current 7 to 5 miles per hour and in the afternoon even more.

Owing to this rapidity of current over a clay bed and low-lying banks, the water is muddy, but it soon clears if left for some time. It is fresh, and has no ill effect on the health of people. Fifteen versts below Perovsk the Syr Daria separates into two branches: the Kara-uziak (northern) and Jaman Daria (southern). The Jaman Daria represents the chief navigable stream, but on account of its winding and shallow channel, which considerably interferes with the development of the river traffic, it has the appellation of the "bad" river, *i.e.* "jaman". The Kara-uziak is too shallow to be navigable; in spring it overflows and forms extensive marshes overgrown with reeds.

At Fort Karamakchi (Fort No. 2) both streams rejoin, and the river from thence to its estuary flows again under the name of Syr Daria.

In the lower reaches (from Fort No. 2 to the sea) there is plenty of water in the river, and the depth and straightness of the channel is suitable for vessels of deep draught. At the estuary it divides into three branches by which it empties itself into the sea. The middle stream is so shallow that the Kizghiz ford them, and the water being directed into the centre one, which is the deepest and most navigable. The sand brought down by the current has accumulated at the mouth of the river, forming the island of "Kossaa-aral."

At Kazalinsk the Syr Daria freezes in the beginning of March and is open again in the middle of March. At Chinaz it freezes for about two weeks, while at Khojend it does not freeze at all. Floods occur in March, May, and August; the first flood is the most considerable, the others are less so, and do not take place every year.

The chief tributaries of the river Syr Daria on the right bank are:—the *Jungal*, *Uzun-ata*, *Kassan*, *Angren*, *Chirchik* (formed by the rivers *Chatkal* and *Pskent*), *Keles* (formed from seven numerous feeder streams), *Boroldai* and *Badam*, *Bugun* (formed by itself in the sands before reaching the Syr), and *Karai* (a small tributary *Kazala*, in the Kazalinsk district).

On the left bank are :—the *Chichikti*, *Kara-daria* (formed from the *Kara-kulja* and *Tar* with its numerous affluents, of which the *Kursh-ab* is the best known), *Ak-bura*, *Isfairam*, *Sokh*, and *Ak-su*. Tributaries which flow into lakes before reaching the Syr, are :—*Yani-daria*, *Kuvan-daria*, and *Kara-uziak*.

The *Yani-daria* separates itself from the Syr about 6 versts below Perovsk, flows south-west in a very winding course, and, having given off a stream called *Batpak-utkul*, loses itself in the sands.

The *Kuvan-daria*, after separating from the *Jaman-daria*, goes west and then north in an independent channel to the Aral Sea, where it forms an overflow covered with reeds ; for the greater part of its length its bed is usually dry, only at times having water in it.

MARSHES FORMED BY THE SYR DARIA.

In the Ferghana district are, (1) the marsh "*Damkul*" formed by the overflow of the irrigation canal *Mussulman-kul*, the water of which is taken from the Syr Daria. The sandy steppe lying between Kokand and Margilan ends with this marsh.

(2) *Nazini* and *Loqa*, situated between the Syr and its tributaries in the Khojend district, in the "*Golodnaia*" steppe.

From the tributary *Kara-uziak* is formed, in the Perovsk district, an extensive, impassable swamp called "*Bakali-Kopa*". This marsh is 100 versts (66 miles) in length by 15 to 30 (10 to 20 miles) in breadth. Communications across it are only possible in winter by paths known to the local Kirghiz. At this marsh the post road makes a circuit to the north.

To the south, formed from the *Kuvan-daria*, is another marsh 70 by 20 versts. This has no name.

In the Kazalinsk district the overflow of the Syr forms a swamp known by the name of "*the Taban-kul flood*." It is to the west of Kazalinsk town. Between the streams at the mouth of the Syr is continuous marsh land.

The general character of all these marshes is that they are covered with little hillocks overgrown with sedge and rushes. These afford cover to wild boars and tigers—a source of danger to the neighbouring villages—and wolves. At the hottest season of the year the marshes swarm with insects ; they also develop most virulent fever which is the scourge of the country near them.

THE AMU DARIA RIVER.

The second very important and full-volume river is the *Amu Daria* or *Oxus*. This river forms one of the boundaries of the Turkestan country. It takes its rise in Lake Sarikul (Victoria) on the Pamir plateau at a height of about 13,000 feet. Up to where it is joined by the

Surkh-ab or Wakhsh river (in our territory the Kizil course of the Amu is through a mountainous country in several times changes its direction ; after its confluence with the Wakhsh the direction of its flow is north-west over a level ground. From this it will be understood why the upper reaches of the Amu is very rapid (6 miles an hour more), while it gets less rapid towards the estuary ; the Amu is on the whole a swifter river than the Syr. It varies from 150 to 350 sajenes (350 to 800 yards). The stream alters with the time of the day and also year in case of the Syr. The Amu freezes at its mouth for a less.

As towards its source the river Amu receives a large number of affluents issuing in nearly every case from glaciers and snow, down a great quantity of water, it becomes navigable from the point of confluence with the Wakhsh throughout the year ; there are no fords anywhere ; the crossing is effected by boats (native canoes).

From the fortifications of Nukus the Amu splits up into several streams, which, at one time united and at another separate, send the waters to the sea in two principal channels ; the western the *Taldik*, some years runs almost dry, while the eastern the *kun-daria*, has more water, though even in it large boats navigation difficult.

The whole plot of land between these two rivers is almost all marsh. At the mouths of the Amu is an expanse of marsh covering 10,000 sq. versts (4,500 sq. miles).

The chief tributaries on the right bank of the Amu are the *Kafirnahan*, *Kizil Su* or *Wakhsh*, *Khagan*, and *Zerafshan*, but the last, after reaching the Amu, forms, so as to be a separate steppe river.

In the lower parts the water of the Amu is made more fit for watering (by means of a number of important canals) both on the Khivan side and our own ; on our bank mentioned the "*Buz-yab*" canal and others.

The *Kizil Su* rises in the Alai mountains and flows on the Alai plateau, where numerous streams from the hills on the north pour their muddy waters into it. From the rapidity of the current and the clay soil the colour of the water is always red, which fact it derives its name of "*kizil*" or red. From where the *Muk-su* runs into it, on the borders of Karategin, the river is called *Surkh-ab* (from the Persian, meaning "red") further on "*Wakhsh*," which appellation is retained up to its confluence with the Amu.

In our territory the course of the Kizil Su is swift ; its breadth is from 20 to 30 sajenes (45 to 70 yards), depth about 17 feet. It is too shallow to be navigable, and there are numerous fords before it leaves our border ; in the centre part of its length it is however unfordable, and crossing is effected by means of inflated skins.

There is one bridge, near Garm (capital of Karategin), called "*Sar-i-pul*."

The river Zerafshan issues from the glacier of the same name.

River Zerafshan. It flows at first through mountainous country in an extraordinarily narrow gorge, in which the water foams and swirls almost like a waterfall. It is only on reaching the town of Pandjkend that the channel begins to widen and the water to calm. Even here, however, the current is very rapid (over 5 miles an hour) ; from Panjdkend it begins to be possible to float timber down to Samarkand and Bokhara.

Eight versts above Samarkand* the river divides into two parts ; the northern is called *Ak-daria* and the southern *Kara-daria*. These two streams, distant from 10 to 18 versts from one another, join again on the very borders of our territory near the Bokharan settlement of Khatir-cha. The ground thus left by the parting of the waters of the Zerafshan forms an island, which is called "*Miankal*" or "*the Miankal valley*." From the town of Kermini (in Bokhara) the Zerafshan flows south-west, and from Bokhara its course is through a sandy waste, where it ends in a small desert lake called the Karakul ; this lake is really nothing but the overflow of the river.

The total length of the Zerafshan is over 600 versts (400 miles), and in our territory 309 versts (206 miles). It is shallow and its bed is full of large rocks, and can therefore be forded easily in places, but it is not navigable anywhere.

The floods of the Zerafshan take place in :—the end of March (1st floods), the beginning of June (2nd floods), and in September (3rd floods).

On its right bank it receives water from about 50 subsidiary streamlets, and on the left from its chief tributaries the *Fan-daria* (formed from the confluence of the *Yagnab-daria*, *Iskander-daria* and *Surkh-ab*), *Maghian-daria*, and the rivers *Var* and *Shink* flowing out of lake Marguzar.

* At the foot of the Chupan-ata heights, which represent, so to speak, the centre of the Zerafshan district. From these heights with a telescope and in clear weather can be seen Panjdkend and Urgut.

THE VALLEY OF THE SYR DARIA.

I. The valley of the upper Syr or "Ferghana valley".

The Khanate of Kokand is shut in on the north, south, and east by hardly passable, steep mountain ranges, and it is only on the west that a strip of land (about 10 versts or $6\frac{3}{4}$ miles broad) unites it to the general plains. In this general valley are numerous small streams, and defiles watered by unimportant rivers running either to the Syr Daria or to the Amu Darya.

The valley has an amygdaloid form, and is about (166 miles) in length by 100 (66 miles) in breadth.

The soil consists of:—(i) places covered with rubble and sandy wastes, and (iii) fertile loam soil. The valley is really a desert, and it is only by artificial irrigation that it has been converted into a fertile country. For this reason the general impression is the same as that conveyed by the name of Kokand, viz., a valley covered with fields and gardens, intersected by numerous canals.

All the life and wealth of the country is concentrated on the southern bank of the Syr; the northern, having a steppe character, is less frequented by settled inhabitants, but forms excellent pasture land for the herds of the nomads. The climate is very hot, and there is hardly any winter.

Climate.

The chief occupation of the settled inhabitants is agriculture and horticulture (corn, cotton, &c.).

Trade and occupations of inhabitants.

and horticulture (corn, cotton, &c.) growing), and the trade arising from these industries; the mineral wealth of the country is also well known, but the natives neither desire nor work it, and consequently this is left to the Russians.

Inhabited points.

Settled points are scattered along the shore of the Syr Daria, not on the river itself, but on the large mountain aqueducts, all of which is expended in irrigation. In this way are situated the towns of Kokand, Margilan, Andijan, and others.

There are about one million inhabitants in the Ferghana valley—2,400 to the square mile*—and it is therefore designated as "dense."

Population.

Besides the Russians the inhabitants of this valley include *Sarts*, *Tadjiks*, *Kirghiz*, *Turks*, *Dunganis*, *Kipchaks*, *Karakalpaks* (lit. black caps), *Jews*, *Uzbeks*, and *Indians*.

2. The second valley of the Syr lies between Kokand and Jizak.

The Khojend valley.

Here also agriculture forms the staple trade of the people, and the export of the Khojend silk has long made this valley famous.

* This must be a German sq. mile; in English it would mean about 2,500 sq. mile. Transl.

neighbouring markets. Cotton is also grown in abundance by the local inhabitants.

Here we have a chain of inhabited points stretching from Khojend to Jizak, and further on towards Nurata. Among them are several commercial towns and settlements such as—*Khojend, Nau, Ura-tapa, Yani, Zamin, Jizak*, and *Nurata*, and in addition about 250 kishlaks with settled populations. There are also nomad Uzbeks, and Kirghiz.

3. The valleys of the Angren, Chirchik, and Keles rivers with their tributaries form, from their fertility, a suitable dwelling place for the inhabitants of the whole Syr Daria province. For this fertility the district is indebted to the abundant waters of the Chirchik, the chief tributary of the Syr, and numerous irrigation channels leading out of it. Without this irrigation the land would be a desert. In these parts the canals are to the ground what the veins and arteries are to the human body. As blood flowing in the latter gives life to the man, so the water flowing in the canals gives life to the desert.

From the Chirchik from time immemorial the water has been diverted by the natives by means of three great canals:—

(i) *Zakh-arik*,* 45 versts (30 miles) from Tashkend.

(ii) *Bos-su*, 30 versts (20 miles) from Tashkend; and (iii) *Gadregan*, 75 versts (50 miles) to the east of Tashkend.

These three important canals water also the town of Tashkend by means of a whole network of secondary channels (such as the *Kara-su*, *Salar*, *Chauli*, &c.,) running out of them in various directions.

The river Chirchik, the chief tributary of the Syr, receives its commencement from the confluence of the Chatkal and Pskem, which rise in the Chatkal and Talas Ala-tau mountains respectively. After 40 versts (26 miles) of its course the Chirchik fills the large *Zakh-arik*, and through it supplies part of its water to the river Keles, and by another broad arik—the *Kara-su*—pours water also into the Angren; thus the abundance of the Chirchik, whilst irrigating by means of yet other canals all the country lying round Tashkend, lends its aid also to the remaining two fertilizing rivers of the valley.

Near the source of the Chirchik gold of high proof is found.

The Angren takes its rise in the spurs of the Chatkal range, and flows through a densely populated valley, the inhabitants of which are engaged solely in agriculture; in the summer the mouths of the Angren dry up, as all the water is diverted for irrigation purposes.

* *Arik*.—This is the native name for an irrigation canal, and as it is in common use all through Central Asia it is retained in this work.—Transl.

The Keles rises in seven streams in the mountains formed by the spurs of the Talas. The River Keles has a course of 136 versts (90 miles) and contains very little water; the valley of the Keles is indebted to the waters of the Chirchik for its fertility.

On nearing the Syr Daria, these three valleys (the Angren, Chirchik, and Keles) run into one another and form a kind of plain bearing more the character of a steppe. The mouths of the three rivers are comparatively near one another. For instance, the Chirchik falls into the Syr 10 versts (7 miles) below the Angren, and the Keles 20 versts (14 miles) below the Chirchik.

The soil of all these valleys is loam, excellent for agriculture. On level spaces on the hill sides various cereals are grown, and lower down rice, wheat, and tobacco; in the gardens are grown apples, peach, apricot, and other fruit trees. Generally speaking this valley of three rivers, with its extensive and abundant water supply is renowned for its fertility.

The bulk of the native population are *Kuramins*, and come the *Sarts*, *Tadjiks*, and *Kipchaks*. The first and second named (*i.e.* *Sarts* and *Tadjiks*) are dwellers in the towns; the *Kipchaks* live in order with their flocks and herds on the mountains of the district. The following inhabited points deserve mention.

Tashkend—native and Russian, and old *Chinaz*; in the Angren valley; *Iskend*, *Taliau* and *Ablık*; in the Chirchik valley:—*Nicholsk*, *Troitsk*, *Nadezhdinsk*, *Sretensk*, *Chirchik*, *Parkend*, *Niazbash*, and many others. In short the valleys of the Angren and Chirchik represent the richest, most fertile, and most populous part of the Tashkend district, and Tashkend the most populous spot in Central Asia, and the market of the Syr Daria basin.

4. The valley formed by the river *Aris*, 300 versts (miles) in length, and its full-volume is formed by the *Badam*†, *Ak-su*, *Mashat*, and *Bogachan*. It possesses a fruitful soil and fairly dense population. The fertility is not however the same all over, depending as it does on irrigation.

In all the foregoing streams the natives find gold. Far from Chirchik work gypsum and rock salt.

Inhabited points are:—

* The word "*steppe*," as employed by the Russians, must be understood in the sense of open, level, or, more generally, undulating plain, not by any means necessarily devoid of vegetation or desert. It is important to bear this in mind in reading the Russian text, which refers so very frequently to real deserts.—Trans.

† *Nadam* according to Walker's map of Turkstan.—Trans.

The town of Chinkend (on the Badam), Belovodi, Sairam, Mankend (Russian and native), Karabulak, *Inhabited points.* Yas-Kechu, Chak-pak, &c. In the neighbourhood of the mouth of the Aris are the ruins of the large ancient town of "*Atrar*", where Temuchin died. Almost in the same place are found also the ruins of other large towns, *Sauran*, *Charnak*, and *Sunak*.

5. The valley of the river *Bugun* with its tributary the *Chilik* has good soil, and is covered with fields and meadows, both natural and artificial. Along the course of the *Bugun* and *Chayan* is grown *wormseed*, known by the name of "*darmen*." This is the only place in the world where this wormseed grows in such abundance. It is found here in a wild state, and affords a good means of livelihood for the natives. From it, in the chemical factory in *Chemkend*, is made the valuable pharmaceutical preparation "*Santonine*."

6. Near the mouth of the *Syr Daria* is formed the little tributary *Kazala*, about 50 yards broad and 14 feet deep. It is soon exhausted by the numerous irrigation canals on both banks, and losing its proper channel flows by a hardly noticeable ditch; but to the northward of this stream stretches the valley called *Aigerik*, which is considered one of the most fertile spots in the *Kazalinsk* district. Here the *Kirghiz* have always been able to raise good crops. The valley is 25 by 10 versts (16 by 7 miles). *Aigerik valley.*

7. The valleys of the left bank tributaries, *Yani-daria* and *Kuvan-daria*, were in former times colonized by *Karakalpaks*, who also occupied themselves in corn-growing, but at present there are no settled inhabitants; the abundance of *saxaul* and *rushes* however attracts the *Kirghiz* in winter, and they now do the sowing. In summer however they wander away, leaving the old people to attend to the agriculture which is now greatly developing. *Valleys of the Yani-daria and Kuvan-daria.*

Along the banks of the *Syr Daria*, up to the mouth, and also along the tributaries *Ber-kazan* and *Karauziak* are strips of fertile land with the following inhabited points:—

Kazalinsk, *Karmakchi* (Fort No. 2), *Perovsk*, *Julek*, *Turkestan*, and the settlement of *Alexandrovsk*.

VALLEY OF THE AMU DARIA.

1. The *Alai valley* commences with the *Tau-murun* pass and ends at the plain "*Bolshoi Karamukh*." It is bounded on the north by the *Alai mountains* and on the south by the *Trans-Alai*. The length is 140 versts (93 miles) and breadth 10 to 15 versts (7 to 10 miles). *Alai valley.*

It is watered by the river Kizil Su.

In the summer months the whole length of the covered with luxuriant pasture, in consequence of which the whole of the nomad population of the southern part of the Ferghana province and Khoj-nd district concentrate for the summer. Near Daraut-kurgan are sown wheat, and barley, but in inconsiderable quantity.

In winter communication with the valley is cut off, as the passes are covered with snow; all the nomads hasten away at the first fall of snow, and the Alai valley is deserted save for the roaring of the winds and howling of the hungry wolves about Daraut-kurgan (in the west of the valley) though there are, however, even in winter, a few beggars (*baigushi*), and a few herds of yaks. From this place a large number of caravans lead into the Ferghana valley, but the chief caravan route is by the Taldik (11,000 feet) and Terek-dawan (12,000 feet). The first leads into the middle of the Alai valley and thence to the town of Kashgar, and both, after uniting at the mouth of the river of ground, *Sufikurgan*, follow the river Kurshab, and the traveller into the Ferghana valley near the town of Yangi-Yul.

The remaining passes are only fit for single travellers, and caravans cannot go over them.

The Zerafshan valley is one of the richest in central Asia.

The Zerafshan valley. The Zerafshan river the most fertile river of the valley. The latter is the cause of the fertility and richness of the whole valley, and affords subsistence to masses of settled inhabitants, thus been well named by the natives "Zerafshan," which means "gold-bearing."

The whole valley may be divided into two sharp portions—the eastern—mountainous—and the western—fertile. The northern boundary is formed by the Turkestan mountains, and the southern by the spurs of the Hissar range. From the above referred to we see that nearly half the valley is covered with mountains, and that there therefore remains not more than 5,000 sq. versts (2,300 sq. miles) of ground suitable for cultivation. Yet notwithstanding this comparatively limited area of fertile soil, the Zerafshan valley may claim to be considered the richest of the whole Central Asian world, and most especially of the eastern part. We will turn our attention first to the eastern section, and afterwards proceed to the western.

In consequence of its hilly character the natives call the eastern section of the Zerafshan valley the "country of mountains." The inhabitants are the "*Galchas*,"† and the

* *Jenushka*—a sort of lucerne—Transl.

† "*Galcha*" is derived from "*Galis*," which, in the language of the natives, means "rude speech;" hence *Galchas*, the "rude speakers." Author.

be descended from the Greeks who came here with Alexander the Great of Macedon.

They are a destitute people, and their efforts at agriculture produce but small results owing to the stony nature of the ground, which renders it unfit for cultivation. They sow barley, but the harvest at best is only threefold, and corn can hardly be got to grow at all. Their chief means of subsistence is therefore sheep-rearing, each village having its own hills. Their sheep and goats represent their riches and mules their mode of transport. Besides this, these people prepare hides, a kind of coat (*chekmen*), lassoes, felt, and matting. They are also beginning to occupy themselves more and more with the production of raw wool and cotton wool.

Kohistan does not possess a single town of commercial importance. Of the inhabited points the following mountain "*tumens*"* are the most important:—*Panjkend*, *Urmitan*, *Fan*, *Farab*, and *Maghian*.

The western end of the valley is flat and low. From where the river Zerafshan issues from Kohistan (*i.e.* from Panjkend) there begin to branch off from it enormous irrigation canals carrying the water over the fields and gardens. Some of these canals date from very ancient times. The water, when it recedes from the fields, leaves on their surface a fertile alluvial mud—which is its "*gold*." This mud forms also excellent dressing for fields which have not been flooded.

The richest and most densely populated spot in the valley is the island of *Miankal* situated between two tributaries of the Zerafshan, *viz.* the *Ak-daria* on the north and *Kara-daria* on the south. It is artificially irrigated from the *Kara-daria*, the *Ak-daria* watering the northern part of the valley.

The cultivation and sowing of this island are carried out in the most careful manner; there is not an inch of ground anywhere allowed to lie fallow.

To the fertility of the soil and abundance of water must be ascribed the extraordinary harvests obtaining here; fields of cotton, wheat, barley, rice, *jugara*,† maize, *indau*, *makhsara*, tobacco, lucerne, shrubs from which dyes are extracted, vegetables, and trees growing in the hedges or on the banks of canals meet the eye in all directions. Such is the general description of the island; the remainder of this section of the valley with its *kishlaks* presents the appearance of a boundless garden. The growing of fruit and mulberry trees, rearing of the silk worm, cotton picking, and fruit drying, are—after agriculture—the chief industries of the inhabitants.

* *Tumen*.—"deep." In answer to the question "Where do you live?" the native answers "*Tumen-da*", *i.e.*, in the depths of the mountains. The *Tumens* are therefore mountain depths or ravines, or settlements in the same.—Author.

† *Jugara* or *sorghum* grows to a height of over 9 feet and supplies food for both man and horse. The grain is ground into flour and eaten in the form of cakes. When barley fails, horses get 7 lbs. per diem of this grain. The green stems afford excellent fodder for the milch cattle, whilst the sheep eat the leaves. The stems also when dried are used as fuel.—(Rostenko)—Transl.

The bulk of the native population is composed of Uzbegs; they are a most hard-working and industrious people. The most populous, and in a commercial sense, important points are *Samarkand* and *Katta-Kurgan*. *Samarkand* is the sacred Mussulmans of Central Asia. The chief kishláks are *Chiliak*, *Mitan*, and *Pai-Shamba*.

3. In the Amu Daria section the banks of all the islands formed by the great river or its tributaries may be taken upon as fertile. The fertile strip of land on the banks (extent in the Amu Daria section about 3,500 sq. versts or 3,500 sq. miles) supplies food for the population of the entire section.

The total fertile extent of land comprised by all the islands formed by the tributaries of the Amu Daria amounts to 10,300 sq. versts or 10,300 sq. miles. These islands are inhabited by Karakalpaks, and grain and cotton are grown on them. The chief inhabited points are:—*Shurakhan*, *Petro-Alexandrovsk*, *Abbas-vali*, *Nukus*, and *Chimbai*.

CHAPTER IV.

RIVERS OF THE STEPPES, THEIR VALLEYS AND MOUNTAINS

The steppe rivers flowing to the north are:—

The *Talas* and the boundary river *Chu* with its tributary the *Kuragata*.

(a). The river *Talas* is formed by the junction of the *Uch-Kok-Su* and *Ala-tau* mountain streams flowing respectively to the north and south.

The *Talas*.

Near its source it flows under the name of *Uch-Kok-Su* on reaching the valley it is known as the *Talas*.

The two streams alluded to above flow through narrow defiles, and receiving the waters of many rivulets on their way pour across the mountains in a most picturesque manner. At this stage the course of the *Talas* is westerly. After the *Tura* joins it on its left bank and from where it enters the river widens, and separating up into a number of channels flows through with excellent meadows on them. From here also it turns north and finally falls into lake *Kara-kul* after a course of 850 versts (233 miles).

In the upper and central portions of its course the current of the *Talas* is rapid, but lower down it gets much slower.

Indau or *eruca* grows up amongst the flax, and from the seeds of it is extracted an oil which is mixed with the oil extracted from the flax (*Kostan*) is also said to be useful for machinery—Trans.

* *Uch-Kok-Su* according to our maps—Trans.

+ This appears to be the *Ters* river according to General Walker—Trans.

shallow that the channel is often filled up with sand, and dams are formed which prevent the water reaching the Kara-kul. The river is most full of water in May and most empty in September; in the twenty-four hours the time of highest water is after 3 p.m.

The valley watered by the Talas is covered with cultivated fields, and in the upper parts are excellent pasture lands; lower down the Kirghiz find suitable wintering places.

The river *Asa* (or *Asanin-su*), a tributary on the left bank of the river *Asa** a tributary of the Talas, is deserving of attention. From beginning to end it waters the arable lands of the Kirghiz, and renders the valley fertile through which it flows. Notwithstanding the fact that in its course lie two lakes, Bilu-kul and Ak-kul, in summer it does not reach the river Talas, all the water being used up for flooding the fields.

The aboriginal inhabitants of these valleys are Kirghiz, but they do not possess any settled points of habitation; settlements of Russians, Germans, and Dunganis are the following:—

The town of Aulia-áta, and the Russian settlements of Mikhailovsk, Toimakentsk, Pokrovsky, Alexandrovsk, Dmetrievsk; four colonies of "*Menonites*" (Germans), and Jelpak-tubin and Sanlak (Dunganis).

The general valley of the Talas and its tributaries forms, both from the climate and soil, one of the most suitable spots for Russian colonization.

The chief lakes of the Talas valley are:—Bilu-kul, Ak-kul, Arik-balik, and Kara-kul.

Lake Bilu-kul receives water from a number of streams, which, however, dry up in summer. It is 20 versts (13 miles) in length, by 8 (5 miles) in breadth. The Kara-kul lake is simply a network of streams, amid sandy banks, formed by the overflow of the Talas. The country in the neighbourhood of the Bilu-kul lake is salt-impregnated, though the water in the lake itself is fresh. The shores are covered with reeds and sedge, in which are found wild boars and tigers. Numbers of wild geese, duck, herons, cranes, and swans are to be seen on the water and around the edge of this lake.

The following fish are caught:—carp, pike, sheat-fish (*silurus*), and "*marinka*" (a kind of trout); the last-named abounds in nearly all the steppe and mountain rivers of the country.

(b). The river Chu rises in the Tokmak district, and has a course of 900 versts (600 miles). It is formed

The river Chu. from a large number of mountain streams, (Karakul, Kizart, and others) flowing from the spurs of the Tian-Shan mountains, and has therefore a plentiful supply of water. At first it is called the Koshkur, but from the Buam defile to the mouth, the Chu. It empties itself into lake Saumal-kul.

* This appears to be the Ters river, according to General Walker's map of Turkestan.—Trans.

From its point of issue from the Buam defile flows over more level country in several streams, and on the boundary of the Turkestan country takes the character of a river.

The chief tributary of the Chu is the Kurgati, bank, and the latter also has the tributary Jakinda.

The Chu becomes navigable after its confluence with the Kurgati.

The valleys of many of the tributaries of the Chu, of "steppe" character and the ease with which they can be irrigated are distinguished for their fertility; for this reason we find several large inhabited points:—Chaldavar, Merké, Naryn, Kuzminsk, and Kamensk.

The abundance of fish (carp, pike, crucian-carp, &c.) has given rise to a flourishing fishing industry. The lower course of the Chu, where it flows through sandy steppes covered with low vegetation, forms an excellent wintering place for the Kirghiz. In this part are found nomad Kirghiz and Karakirghiz who occupy themselves in agriculture: they are able to grow wheat, barley, *tarik*,* *kunak*,† peas, lucerne, and oats.

LAKES.

The chief lakes in this part of the country are the following:

Saumal-kul, Ashche-kul, Tele-kul, Kultuz, Khan-sultan, Kamish-libash.
Lakes of the Chu basin. salt, muddy swamp *Jaman-klich*.

Saumal-kul is a broad basin of water situated on the sandy hills (barkhani), and is fed by the river Chu.

Ashche-kul and *Tele-kul*, which receive the waters of the river Sari-su, really consist of a number of lakes connected by broad streams, of which the waters are united into one lake. The length of *Tele-kul* is 12 versts (8 miles) and the breadth 6 (4 miles); its depth is only about 4½ feet. The shores are flat and covered with tall reeds. In spring a great deal of water is brought down by the Sari-su, and the level of the lakes is considerably raised.

Aris-kul is on the boundary between the Perovsk district and the Akmolinsk.

The *Kultuz* lake possesses large quantities of salt, and is so named to the fact of its being situated so near to all inhabited points and passable roads, that it is not worked.

The *Khan-sultan* and *Kamish-libash* are lakes in the

* *Tarik*—millet (Kostenko)—Transl.

† *Kunak*.—A small kind of millet (Kostenko)—Transl.

Khan-sultan and Kaminsh bash. district, and are remarkable chiefly for their great extent.

The chief are :—*Jiddé, Kara-teren, Khwaja-kul, Alik-balik, Liayakan, Sulutubelik*, and others ; also the swamp *Bash-khash-sor*. The whole settled population, both of the steppes and mountains,

Lakes of the Amu Daria section. makes use of the salt obtained from these lakes (as also from lake Tuz-Khana), and the salt industry extends as far as Tashkend. In winter the ground about the lakes is covered with snow, so that the salt is obtainable only in the summer and autumn.

This lake occupies an enormous area with undefined boundaries.

Khodjend district. It is 15 versts (10 miles) north of the kish-lák of Nurek. From the abundance of salt in Lake Tuz Khana. it, it has received its name of Tuz-khana or "house of salt."

The Tashkend district has two lakes:—*Kara-kul* 30 versts (20 miles) west of Tashkend on the upper course of the Angren river, and *Arasan-kul* with the hot springs of the same name.

In the Samarkand province is the fresh-water lake of *Iskander-kul* and a few others of minor importance. The Samarkand province. *Iskander-kul* lies in a deep basin about 10½ versts (7 miles) in circumference, surrounded by calcareous hills bearing various names. The lake itself is 7,000 feet above the level of the sea. It is fed by mountain streams and freezes for about a fortnight during the month of February. Out of the lake of *Iskander-kul* runs the river of the same name. The shores are covered with beech and juniper forests.

In the Ferghana province there are the following lakes :—

Sarichilek, a fresh-water lake in the northern part of the Namangan district, remarkable for its great depth.

Ak-siken near the settlement of Kamish-kurgan (Namangan district), a salt-water lake from which the natives obtain salt.

Balikchi, near the point of confluence of the rivers Kara-daria and Syr Daria, several square miles in extent.

Lake Kara-kul on the Pamirs, into which run a large number of mountain rivers, is situated at a height of 12,000 feet above sea level; this is the largest lake in the country after the Aral sea.

Besides the above mentioned lakes of the different provinces, districts, etc., there are many others, but they are either very small and insignificant, or simply formed by the overflowing of irrigation works.

General remarks on the lakes of Turkestan. In considering the general qualities of the lakes of the Turkestan country we come to the following conclusions—

(1) They are nearly all bitterly salt; (2) certain contain fish in abundance, and therefore present a good the, fishing industry; (3) several are simply formed by the overflow of the rivers running into them; (4) the greatest of lakes are found in the steppes; and (5) at the present time these lakes bring little profit to the country owing to the fact that the bulk of them lie in the midst of desert and are inaccessible from all roads and communications.

The Turkestan country, considerably elevated in the north, and sloping downwards towards the south.

The Aral sea, which extends west, terminates in a depression (233 miles) long (from north to south), and 350 versts (107 miles) broad (from west to east). This depression is occupied by the Aral sea,* depth 90 to 260 feet. It is 162 feet above the level of the Caspian and the water is salt and bitter.

The northern shore is partly bordered by heights, but the coast line lies low (the prolongation of the Kara-kum desert); inland the country is covered with low hills and shifting sands.

The country on the east and south is flat and the coast line is irregular, and there are many shoals and reefs. The southern portion of the Aral sea does not freeze even in winter. The Syr Daria flows into it on the east and the Amu Daria on the south.

The western shore consists of lofty, precipitous mountains, rising to 300 feet in height. The banks are steep and inaccessible, and where there are approaches to the water's edge they are covered with rushes, thorns, and saxaul.

The prevailing wind on the Aral sea is north-east, and dies down several times in the 24 hours.

The chief inlets are:—the *Perovsk*, *Taldik*, and *Sarai* gulfs; the chief islands—*Kossa-aral*, *Lebiashi*, *Barsa-kul*, and *Nicholai I.*

All the islands are uninhabited with the exception of *Nicholai I.* and *Barma*, on which some Kirghiz pass the winter and raise wheat and barley. They also find pasture for their flocks, and pass over from the mainland either by fording, or by the ice.

On the larger islands, such as *Nicholai I.*, limestone is quarried. In the estuaries of the Syr and Amu Daria thousands of people are engaged in the fishing trade; the principal catches are:—*small sturgeon*, *sterlet*, *sheat-fish*, "*zherekh*," *sand carp*, *bream*, *pike*, and *tope*.

* Wrongly called "sea," as it has no outlet anywhere affording communication with the ocean.—Author.

M. Ostroumoff consequently proceeds to talk of the Aral "Lake" throughout his book; but I have continued to call it "sea," as it is so called in the Russian language. How about the Caspian sea? It has also no outlet, and M. Ostroumoff calls it the Caspian lake!—Trans.

When caught the fish are let loose in fish ponds until the first frosts commence, when they are taken out and sent fresh to the town of Orenburg. A certain proportion of the smaller fish and sterlet are salted for sale within the limits of the Turkestan country. Caviare is also prepared, and represents a very profitable export (price 40 roubles per pood of 36 lbs).

The reedy jungles on the shores of the Aral afford cover to tigers and numberless wild boars and pheasants. Although the Aral sea forms an outlet for two of the largest rivers in Asia, navigation on its waters is nevertheless still in its infancy. The causes of this may be traced to the barren and uninhabited shores, the absence of harbours, and the restless north-easterly winds. In time, doubtless, the fishing will prove of considerable benefit to the country.

CHAPTER V.

THE CLIMATE, AND ITS INFLUENCE ON THE HEALTH OF THE INHABITANTS.

The Turkestan country is situated in the warmest zone of the Russian dominions, Samarkand being the most southern town of any importance in the whole empire; but owing to its situation in the very centre of the Asiatic Continent far from all oceans and seas, its sandy and very little wooded character, its mountain ranges shutting out from it all moist breezes, while leaving it exposed to the dry Siberian winds—the summer here is very hot and the winter very cold.

In summer there is no dew and the sky is cloudless—rain is a rarity; the air is so dry that iron left out in it does not rust, and no animals or vegetables to whom damp is a necessity are to be found, while on the contrary all those common to hot dry climates are to be met with; such are, of the animal kingdom, the tiger, wild cat, camel, yak, venomous snakes, phalanges, scorpions &c.; of the vegetable kingdom, rice, cotton, the mulberry tree, peaches, apricots, the pistachio nut, pomegranate, and grapes.

The climate therefore of the Turkestan country is that of the interior of a continent, viz., great extremes of heat and cold, in which respect it differs from all the rest of the Russian Empire. To this rule however must be excepted the valleys of the south-eastern portion of the country, which, being protected by mountain ranges on the north from the cold winds of Siberia, and lying open to the warm winds of the south and west, have a temperate winter though a very dry and hot summer. In the Ferghana and Samarkand provinces and Tashkend district snow in winter is rare; instead of the snow there are heavy showers of rain.

In the lower parts of the Syr and Amu Daria winds are very strong, the ground is covered with snow, the rivers with ice. Winter lasts from the middle of November to the middle of March.

The prevailing winds in the north-west portion of the country are north, north-east, and north-west. Let us now examine the seasons of the year more in detail.

In March and April the air is cool, and refreshing.

The spring in Turkestan.

The ground is covered with verdure. The rivers, freed from ice, overflow their banks and fill up the irrigation canals. The fields are ploughed and sown, and birds come into the country in great quantities. It is true, it has been known to snow as late as the middle of March, but these snows soon melt and bring but little harm.

In June and July, except on the mountains, the air is

Summer.

very dry and the heat attains to 40° (in the sun; in the shade it is 30° or 35°). The grass dries up, and that the only green to be found is in the neighbourhood of the canals or rivers, and in the ravines among the mountains. In places artificially watered. The sandy, clayey soil becomes very hot, that even in boots walking is difficult; nothing grows at a height of from 3 to 4,000 feet except on land artificially watered.

For the Russian inhabitants this is the worst time of the year. Everybody hastens to take refuge under some kind of shelter. The nomad population move higher and higher up the mountains as the heat increases (in the north-west the Kirghiz move northwards into the Turgai province), and no one remains in the plains but the corn-growers (the Iginchi). For the natives, however, summer is a holiday after the hardships of winter. They no longer hide themselves in huts and tents, but are always in the open air, and they cease to be hungry, for they now drink *koumiss* (mare's milk) and "*airan*".

Even the cattle look cheerful, and the time for starting their wanderings has come for the Kirghiz, who always move in this moving from place to place with a certain amount of money.

The heat exercises no harmful influence on the crops, which are artificially watered. In these parts, in summer, though the sun threatens unquenchable thirst, burning, and death to vegetation, animals, human beings, and in fact to everything; but once water appears in the irrigation channels the action of the heat is counteracted, and there springs up such a luxuriance of vegetation as the inhabitant of European Russia has no idea of, and which affords such a dense and refreshing shade that one does not willingly leave its grateful coolness. Flowers and trees are not merely the adornments of nature but the

benefit of humanity. In summer it rains very rarely, and the air is consequently very dry. July is the hottest month.

The autumn in the Turkestan country commences in October in the north-west, and in November and

Autumn.

December in the south-east. From November begin the rains, snows, and frosts. The month of November itself is sometimes rainy and sometimes dry. The heat is not so great, and therefore a dry autumn is considered as pleasant as any season of the year. In the autumn the nomads re-descend into the steppes and make for their winter quarters.

Severe winters are not the invariable rule ; sometimes, it is true, there are three or four feet of snow

Winter.

(except in the Ferghana and Samarkand provinces), and it lies for months without melting (during December, January, and part of February), but on the other hand there is often very little snow at all the whole winter, and what there is lies only for a short time, two or three weeks at most.

In the north-western portion of the country however, the winter is more prolonged and severe than in the south-eastern. On the mountains in this part enormous masses of snow collect, and do not melt till June and sometimes even July. The undermentioned ranges of the country are covered with eternal snow :—the Alexandrovsk Mts, the Alai, Trans-Alai, and Hissar. In the desert steppes of the north-west the rivers and lakes freeze in November and are not again open until February ; the frosts are terribly severe (25 to 35 degrees, Reaumur), and exercise a most malignant influence both on the settled and nomad populations, as there is very little firewood to be got in this part of the country.

The steppes, where the cattle are herded, present a pitiful spectacle. The unfortunate animals, digging and finding no food, totter across the snow shivering with cold ; at night there is no shelter for them, and they stand huddled together near the "Auls,"* hanging their heads, and very many of them do not live to see the spring.

NATURAL PHENOMENA IN THE TURKESTAN COUNTRY.

a. In open and flat expanses, in winter, the snow is drifted from place to place under the influence of strong winds called "Burans," and snowstorms or blizzards are formed which at times of severe frost mean certain death to the unwary traveller.

b. In the sandy deserts, in summer, rage sand "burans" (sand-

*Aul.—A collection of Turkestan or Kirghiz huts, (*yurts*), or tents. Used generally as a term for a native village.—Transl.

storms), the tiny particles raised by which cause great inconvenience to the eyes, even if nothing more dangerous occurs.

c. If, after the first thaws, it freezes again, the steppes are covered with one waste of ice. This is called "*djut*," and when it occurs great loss is occasioned among the sheep, as they are unable to obtain food under the ice, and consequently die of hunger.

d. In spring and summer in the mountain defiles, torrents at times rush down, and, overflowing their ordinary channels, carry away and destroy everything in their headlong course; huts, people, cattle, fields, gardens, and plantations, are completely annihilated.

e. Sometimes, but fortunately rarely, hail in summer plays havoc with the fields and crops.

f. In the deserts the phenomenon of "mirage" is constantly to be seen in summer.

g. Earthquakes are very frequent throughout the whole country except the north-western portion. It is noticeable that severe shocks are usually experienced in the month of March after the vernal equinox.

There was a severe earthquake in Fort Verni in 1887, which destroyed nearly half the town.

Although the climate of Turkestan may be considered generally healthy (for both amongst the Russian and native populations, epidemic diseases can hardly be said to exist), nevertheless in certain districts there are sicknesses peculiar to them only; but often as not they may be ascribed to the general conditions of existence, the too free use of fruit, unsuitable habitations, and such like causes, as much as to the climate.

The chief diseases may be classed, according to their frequency, as follows:—Intermittent fever (which is occasioned by damp marsh ground and also by the sharp change of temperature between night and day), sore-throat, ordinary fever, measles, small-pox,* consumption, ophthalmia (especially in the Amu Daria section from the burning dust in the air in summer), "*rishta*" (tapeworm), a disease which attacks the inhabitants of the Miankal valley and the town of Jizak, the Sarts' disease (*Yaria-ugani* or *Pashakhurda*), Siberian plague and goitre, raging only in the town of Kokand; and of course must be added the occasional complete ruination of the constitution from the excessive use of opium.

* Vaccination, although known to the natives, is not yet generally practised: small pox therefore carries off an enormous number of children of native families.

CHAPTER VI.

Natural productions of the country, village life, occupations and trades of the inhabitants, commerce and communications.

Natural Productions.

Having given in outline a geographical description of
 1. The mineral king- the mountains of the south-eastern part of
 dom. the country, we now pass on to an examination of the mineral wealth which they contain. This remains at present either totally unworked or worked only to a very small extent, although there is no doubt that there must be a great store of both metals and minerals in the numerous mountain ranges of the country.

The serious working of metals can hardly be said to exist ;
 Metals. only in certain mountains the natives obtain, in insignificant quantities, *gold* (in the Talas, and Chatkal Ala-tau, Alai, Trans-Alai, and Hissar ranges), and *lead* (in the Kara-tau and Zerafshan mountains) ; besides this there are in many places *silver*, *copper*, and *iron* mines.

A good many of the most useful minerals have been found :—
 Minerals. *coal*, *rock and Glauber's salt*, *soda*, *salt-petre*, *sulphur*, *brimstone*, *alum*, *vitriol*, *petroleum*, and the *wax* obtained from it called *moom*, *gypsum*, *graphite*, *limestone*, and various coloured *marbles*, but the working is confined to a very few of them, viz :—

a. *Coal* ; worked in the mountains of the Chirkend, Khojend, Namangan, and Samarkand districts, for the heating of public buildings.

b. *Marble* ; in the Chatkal Ala-tau and Nuratau mountains ; chiefly for floors and monumental tombstones.

c. *Petroleum and moom* ; in the Chatkal Ala-tau and Ferghana mountains ; for lighting purposes and oiling floors and roofs of buildings.

d. *Limestone and gypsum* are found in almost every range in the country, and are used for stucco and brick making and for building purposes.

e. *Alum* ; in the upper course of the Zerafshan, in Fan and Farab, for medicinal and chemical uses.

The obtaining of *rock salt* for local consumption (obtained in the Tashkend district, and Samarkand and Ferghana provinces) remains to be mentioned, and also that of *evaporated salt*, which the natives collect in large quantities from the lakes and plains, and which finds its way into all the bazars of Central Asia.

There are a great many mineral springs in the country. The
 Mineral springs. chief are:—*Arasan-bulak*, warm springs in the Tashkend district ; the *Pedaus* mineral waters (cold) in Kokand ; *Jalabad-ayup* mineral waters, with both hot

and cold springs, in the Andijan district ; the *Shir* spring in Kattakurgan, and numerous others.

The water of these springs is said to be useful for the cure of internal and skin diseases.

In addition to the flora peculiar to European Russia we have here also much of that belonging to a tropical climate.

2. The Vegetable kingdom. In the lofty mountain valleys and ravines near the snow line grow the *fir*, *juniper*, *Siberian silver fir*, *birch*, *mountain ash*, *hawthorn*, *stunted juniper*, and *black-currant*. Lower down we find the *willow*, *poplar*, *jida* (*Eleagnus*), *kara-agach* (*elm*), *nut*, *plane-tree*, *pistachio*, and *wild apple tree*. In the gardens of the valleys

are grown *peaches*, *apricots*, *almonds*, *pomegranates*, *apples of the various European kinds*, *pears of two kinds*, *plums*, *cherries*, "*alcha*," *mulberry*, *maple* and *acacia trees*, *eilanthus*, *gladeria*, *bigonia*, and many others. Of shrubs the following are cultivated in the

gardens;—*briar*, *vines of various kinds*, *raspberry*, *gooseberry*, *currant*, *blackberry*, &c. In the fields are sown;—

rye, *oats*, *barley*, *wheat*, *millet*, *buckwheat*, *peas*, *flax*, *maize*, *jughara* (*sorghum*), "*mash*" (*a kind of pea*), *rice*, *cotton*, *lucerne*, *kanjut* (*sesamum*), "*mashhara*," *tobacco*, *pepper*, "*burchag*," *saffron*, *hemp*, and the *poppy* for *opium*.

For the dyes obtainable from them;—*madder*, *ruyan*, *usma*, *khnoo*, and *karagul*. For feeding live-stock large quantities of *lucerne* are grown. This grass

gives a most abundant harvest three or four times a year, and one field will not be exhausted in from ten to fifteen years.

Most of the ordinary vegetables and herbs in use grow perfectly in Turkestan, including *melons*, *water melons*, *pumpkins*, &c. A number of medicinal herbs

are also grown. In the deserts the vegetation is limited to the *saxaul*, *mimosa*, and other thorn bushes, and a few kinds of rank and bitter grasses; the marshes are covered with *reeds*, *sedge*, and *bulrushes*.

The extensive growths of reed jungle on the shores of the lakes and rivers, the *saxaul* in the desert, and the lofty mountain ridges, afford inaccessible retreats for various kinds of wild animals; generally speaking they are plentiful in the country.

The tiger and panther, which at times cause a good deal of damage among the flocks and herds of the nomads, are to be found in all the mountain ranges of the country, and in the reeds along the banks of the *Syr Daria* and *Chu* rivers. Leopards are found near the *Aral sea*.

3. The animal kingdom.

Wild animals.

Bears, wild goats, "*arkhari*" (*mountain sheep*), and antelope are met with chiefly on the ranges of the country remarkable for their great height, such as the Alai, Trans-Alai, and Hissar mountains, and deer (*maral*) are only to be found on the highest and most inaccessible mountain summits.

Wild cats, martens, lynxes, wolves, foxes, hares, badgers, porcupines, and wild boars make their home among the saxaul and reedy growths of the steppes, and are found in the jungles at the foot of almost all the mountain chains.

The most important of the domestic animals in use with the nomads are—the *camel*, *horse*, *fat-tailed sheep*, and, in the mountains, the *yak*; among the settled inhabitants we find *horses* of various breeds, *horned cattle*, and *mules* in use.

Waterfowl.

The country is rich in game birds, waterfowl, etc.

In the swift mountain streams *trout* are caught, and in the rivers of the valleys and steppes—*sheat-fish*, *"zherekh"*, *carp*, *marinka**, *pike*, *barbel*, and *cru-*

Fish.

cian-carp. In the two great rivers of the country, the Amu and Syr, and in the Aral sea, are found—the *great sturgeon*, *sterlet*, *small sandré* (*sudak*). In the Amu is a peculiar species of *sterlet*—the *sturgeon*, and "*scafirincus*"—the last found nowhere else except in the Mississippi river in America.

The conditions of climate and soil (sand) are favourable to the development of very many kinds of reptiles and insects.

Of the first may be mentioned the *tortoise*, *lizard*, and *snake*; but the frog is the only amphibious animal. Of the second the chief are the *silkworm*, *wasp fly*, *gadfly*, *hornet*, various kinds of *beetles* and *butterflies*, the *locust*, "*karakurt*," *phalange*, *scorpion*, *tarantula*, *leech*, *centipede*, and that intolerable plague—the *mosquito*.

Village life.

In precisely the same manner as the country naturally divides itself into two sharply defined and very different portions, viz:—the north-western which is desert and sand, and where great differences of temperature are experienced, not only between winter and summer but also between night and day, and the south-eastern with its loamy soil and more temperate climate, so the inhabitants of the country in their character may be divided into two very distinct classes—the *nomads* in the north-west and *settlers* in the south-east. The life of the one is chiefly dependent on *cattle rearing*, that of the other on *agriculture*.

* NOTE.—It is a curious fact about the "*marinka*," that its roe is poisonous and unfit for food, while the flesh is excellent eating.—Author.

Sheep-raising for utility occupies, easily, the first place among the nomads, who count

Cattle-rearing. according to the number of

owned by them. It would be difficult to find a family which did not possess some sheep, and a rich family perhaps own several thousand head; the sheep supply with material for his tent (yurt), food, clothing, and Kirghiz sheep has very long wool and a very fat tail.

After sheep-rearing *horse-breeding* comes next in

Horse-breeding. and some of the nomads possess herds of horses of the Kirghiz

*bairaf** breeds.* They are reared mostly for selling.

Of course the *camel* is bred a great deal among

The camel. for without this useful beast most of the steppes and sandy deserts

besides which the camel supplies wool, milk, meat, for a wide-spreading trade.

Horned cattle are very little in vogue among the

Horned cattle. is the settled population which

advantage from this class of from horses; they use them for transport purposes, and fields, as well as obtaining milk from them.

The settled population, inhabiting the larger oases

Agriculture. clay soil (the most fertile in the country) is occupied chiefly in agriculture,

the nomads very little attention indeed is paid to it.

The form of agriculture practised is that of corn and exchanging of the fruits.

From climatic conditions all land in Turkestan in agriculture must be classed under two headings, — 1st, owes its fertility to artificial irrigation, and 2nd, is capable of producing naturally. The first are low-lying lands usually in broad valleys where the river supplies of flooding them—these are called "*Terenoy*"; the scattered among the mountains, or on the lower slopes of height of not less than 3,000 feet—these are called "*Lyalmi*." Two methods of irrigation exist, the "*Arnel*" system, and "*Chigir*." (flooding?). This gives the Turkestan quite a different character to that of Europe.

Unirrigated lands are common property and have a low value, while certain well irrigated tracts command a high price. Ferghana and Samarkand from their fertility and irrigation must be counted among the richest provinces.

* The "*Karabairaf*" is a cross between the Kirghiz horse and horse called *argamak*. The *argamak* is said to be the best horse of the

sian Empire ; in these provinces a desyatine of irrigated ground sometimes costs thousands of roubles.

Of cereals the most extensively grown is wheat, and of grasses—lucerne; after which come—barley, jugara (sorghum), rice, and millet. The least grown are—mash, Indian corn, oats, buck-wheat, and rye.

The harvest of the various productions differs greatly ; for instance, wheat yields only twentyfold, while millet and jugara yield as much as two hundredfold.

The settled inhabitants (especially in the south-eastern portion of the country) also occupy themselves with horticulture as a means of livelihood, and this is closely connected with vegetable-growing, tree-planting, and a large amount of cotton-growing.

Owing to the fact of the country being almost without forests, very great attention is now being paid to tree-growing, and every kind is planted from the willow to the most expensive fruit-trees inclusive. The plantation of mulberry trees (especially in the south-east) is very extensive.

Vegetable and other gardening is naturally most developed in suitable places close to inhabited points. All vegetables are grown, from onions to melons, and in other gardens we find all kinds of European shrubs and fruit-trees being tried, from black currants to apricots. Vine-growing occupies a great deal of attention ; the dried fruit forms a staple article of commerce, and in its fresh form it is used in enormous quantities for wine.

The growing of tobacco of the best kinds is now being carried out by Russian traders, and the natives produce a very inferior kind for their own use.

The most important department of the whole agricultural industry in Turkestan is undoubtedly the cotton-growing from American staples. This alone makes the country one of the most important in the Russian dominions. Both Russians and natives are employed in the cotton trade. It is carried on chiefly by the inhabitants of the Samarkand and Ferghana provinces and the Syr Daria province as far as the kishlák Mankent, and also on the banks of the river Aris. The cotton wool is taken from the pods, and after being cleaned is exported to Russia. The seeds supply oil and are useful as fuel.

Trades and occupations of the inhabitants.

The manufacturing trade is very little developed in the country, and what there is of it owes its institution to the Russian community, in whose hands also is the monopoly of it. The most numerous, and, judging by the profits, most important factories are the breweries and brandy-distilleries, after which come a few tanneries, soap-works and mills. The remaining industries may be classed as "small trading," and relate chiefly to agriculture and dairy produce.

Among the occupations of the natives, the most deserving of attention is that of *silkworm-rearing*, which is very extensively practised.

The silk is obtained in the following manner. As soon as the mulberry trees begin to sprout, a number of eggs are wrapped up in handkerchiefs and the women wear them about their persons for from three to five days, within which space of time the caterpillars are developed and hatched. They are then turned out on to linen cloths and fed with young mulberry leaves. In about 10 days the worm falls into its first sleep and continues inert for three days, after which it recommences to feed with avidity. This is repeated thrice, and then the silkworm commences to spin its cocoon, and in 12 days the moth issues. This, however, is not allowed to take place, as the silk gets spoiled, so in order to prevent it the cocoons are placed in a heated stove, which kills the chrysalis.

The silk is unwound with the aid of hot water, washed, dyed, and either sold in that form or woven into various silk materials.

The materials woven include *kanaús*, *serge*, *chechun-chu*, *repp*, *grenadine*, and *silk handkerchiefs*; also half silk materials, *bakasab*, *benaria*, and *peripatsha*.

The centres of the silk industry are Samarkand, Khodjend, and Margilan.

Kokand is the chief point from which the silk is exported to Russia. Manufactured silk articles improve yearly in quality. The natives willingly adopt the Russian methods of weaving; in fact, this industry may be said to have a great future before it.

After silk the production of cotton certainly occupies with the

The cotton industry. native the next place in importance. The sale of cotton in Moscow is now a recognized trade.

All cotton manufactured articles are produced by hand, by the women, who sometimes attain to a certain amount of skill.

Cotton is obtained from the plant as follows :—

As soon as the pods burst, the cotton is taken out and "sorted," i.e., separated, by machine from the seeds, and then with the aid of a distaff the cleaned cotton is wound into threads. If it is intended to weave coloured articles, the threads are first dyed and then woven. The natives make all their own ordinary garments.*

* Note.—M. Ostroumoff gives the native names for the various cotton fabrics produced; these are :—

From uncoloured threads, *bias*, *jangala*, and *daka*; the latter rather resembles our *muslin*.

From artificially coloured threads, *buyak*, *susa*, *sansama*, *kalyama*, and *chees* (cotton-print). White threads are used for the underclothing and turbans of the natives, and those discoloured for common outer garments, blankets, and other native articles of dress.

The trade in hides and wool also occupies an important place in the country. The sale of wool is the chief means of subsistence of the nomad population. The leather when manufactured is called *yuft guzar*, *suar*, (thick leather), *opoiki*, and *zamsha* (used for large leather bags). The woollen goods are :—thin felt, carpets, ropes, tunics, caps. The excellent quality of these goods is well known, not only here, but in Russia.

Pottery and brick-making are practised in every inhabited part of the country and especially in the Zerafshan and Khodjend districts. At the latter place there is also a glass factory which supplies the country with cheap glass utensils, etc.

Mining, as has been mentioned, cannot be said to be developed. Metallurgy and mineralogy have at present only reached the prospecting stage. The country is rich in every description of metals.

The manufacture of soap and candles, oil-working, and dyeing are in a rudimentary condition ; coarse kinds of soap and candles are produced, and oil of an inferior quality. The dye industry is not advancing.

The brandy-distilleries, wine-making, and mineral-water factories are by far the most flourishing institutions, producing together as much as a million roubles in the year.

Hunting and fishing, even amongst the natives, is very little practised considering the abundance of wild animals and fish in the country. Salt is obtained in enormous quantities from the numerous salt lakes.

The following industries deserve very marked attention, and are developing :—coal-mining, petroleum-working, santonine, and the rafting of timber down the Syr Daria from Ferghana.

Trade in the interior is very wide-spread, judging, if not by the quantity of goods and the amount of money passing, at least according to the number of bazars and people engaged in it.

The most important articles of export trade with Russia are :—*raw cotton* (price 4 to 8 roubles per pood), *silk*, *cattle*, *wool*, *hides*, *dried fruits*, several kinds of medicinal herbs (*santonine*, *rhubarb* &c.), and several kinds of *dyes*.

The chief imports are *woollen and cotton manufactured goods*, *iron*, *leather goods*, *tea*, *sugar*, *wood* and *glass manufactures*, *beverages*, and in small quantity, *silk* and *dye-stuffs*.

The money received for the transport of goods enables the nomad to pay his taxes. The transport trade may be said to be his special occupation.

* 1 pood = 36 lbs.—Transl.

Banks. The condition of trade enables two banks to be supported, viz., A branch of the Imperial Bank of Russia, and the "Central Asian Commercial Bank."

NATIVE COINS, WEIGHTS, AND MEASURES.

COINAGE.

Native name of coin.	Russian value.	English value. the rouble being taken at 2s/-.
Tilla (gold coin) ...	From 3 roubles 60 kopeks to 4 roubles	<i>s. d.</i> 7/2 to <i>s.</i> 8/-
Tenga (silver) ...	20 Kopeks ...	2½ <i>d.</i>
Cheká (copper) ...	½ Kopek ...	about ½ of a farthing.

MEASURES.

Native measure.	Russian equivalent.	English equivalent.
Tash ...	6 versts and 8 versts	4 and 5½ miles.
Gaz ...	1 ¼ Arshines ...	1 yard.
Tanap ...	A square space having each of its sides 60 gaz in length ...	3,600 square yards. or about ¾ acre.

WEIGHTS.

Native weight.	Russian equivalent.	English equivalent.
Batman ...	12 poods ...	432 lbs. Av.
„ (Samarkand)...	8 poods ...	288 „

Communications and Telegraphs.

The most suitable of all means of communication for passengers and goods in peace time, and for troops in time of war, are railways. On the 15th May 1888, the anniversary of the coronation of their Imperial Majesties the Czar and Czaritsa, the first rail-

way in our country, viz., the Transcaspian railway from Uzun-Ada on the Caspian to Samarkand, was opened.

The construction of the line was commenced in 1880 at the fortifications of Mikhailovsk, and after reaching Kizil Arvat (217 versts) in 1882, terminated there. Between the 15th June 1885 and the 15th May 1888 the remaining portion to Samarkand (1,126 versts) was completed.

The total length of the line is now 1,343 versts (895½ miles), and the journey is accomplished in 75 hours. There are 59 stations, the chief towns passed through being Kizil Arvat, Geok-tepe, Askhabad, Merv, Charjui, Bokhara, Katta-Kurgan, and Samarkand.

With the exception of a few oases of loam, clay, or saline soil, the line runs through a waterless desert, where the shifting sands constantly threaten to bury or breach the permanent way. Across the Tedjend and Murghab rivers iron bridges have been constructed, and across the Amu a wooden one consisting really of four separate bridges united by earth embankments. The total length of bridging is two versts (2,300 yards), height above the water 28 feet, and the distance from one bank of the river to the other 4 versts. This is the broadest river crossed by a railway in the whole of Russia.

Passenger trains run at an average speed of 22 versts (15 miles) an hour, and goods trains at 19 (13 miles). The construction of the whole line cost the Government about 43 millions of roubles. By the successful completion of this railway we raised ourselves in the estimation of all Europe, and strengthened our position in and quieted all Central Asia.

Roads.

Besides the railway there are post-roads, and caravan roads to be considered.

All the roads of the chief towns are, of course, made roads and fit for every description of traffic.

The country is rich in post-roads. A post-road from Tashkend runs to Chimkend, and from here one road branches off through Aulia-áta to Fort Verni and another to Kazalinsk and Orenburg; besides this Tashkend is connected by a post-road with Samarkand and Katta-Kurgan by way of Chinaz and Jizak, and with Kokand, Margilan, and Osh through Khodjend. Kokand by way of Chust is connected with Namangan. Other post-roads connect Khodjend with Jizak via Ura-tubé, and Samarkand with Pandjkend.

The posts run between New (Russian) and Old (Native) Margilan, by a country road of 14 versts in "arabas."*

Between Petro-Alexandrovsk and Charjui and between Osh and Kashgar the post goes twice a month by mounted "jigits"† by caravan routes.

* Country carts with very large wheels.

† Relays of horsemen.

The post to Kashgar was instituted for the convenience of the Russian consulate and the considerable number of Russian subjects living there engaged in trade or other occupations.

The quality of the post-roads depends entirely on the time of the year; in summer they are all good, but in winter movement by them is accompanied with great difficulties.

The chief *caravan routes* are :—

Caravan routes.

1. *Taskkend* to Turkestan, and thence to Turgai, Akmolinsk, and Karkaralinsk.
2. *Perovsk* to Petro—Alexandrovsk, Bokhara, and Turgai.
3. *Kazalinsk* to Orenburg, Petro-Alexandrovsk, Fort Nukus, and Khiva.
4. *Andijan* to Fort Narin.
5. *Namangan* to Aulia-áta.
6. *Osh* to Kashgar.
7. Road from the Zerafshan valley into Karategin and Darwaz.

Many of these roads play a very important rôle in the development of commerce in the country, as for instance the Turkestan, Turgai, and Orsk route.

The camel forms the chief means of transport, the horse being employed as a baggage animal only in hilly country. He carries only 8 poods (288 lbs.), while the camel carries double that amount. The yak is used for transport in the Alai and Trans-Alai mountains. Asses are used for riding by the camel-drivers of caravans. Postal communications are never carried out by any other means than horses.

The remaining roads are those connecting the kishláks and auls of the natives : some of these are passable for wheeled traffic. The only native vehicle is the araba.

The only river traffic worthy of the name exists in the lower reaches of the Syr and Amu Daria rivers, and is carried on in boats. On the Amu Daria however is the Amu Daria flotilla consisting of two large steamers (the "Czar" and "Czaritsa"), barges, boats, etc. The boats in use everywhere are called "kaiyuks." They are towed up stream by men or horses.

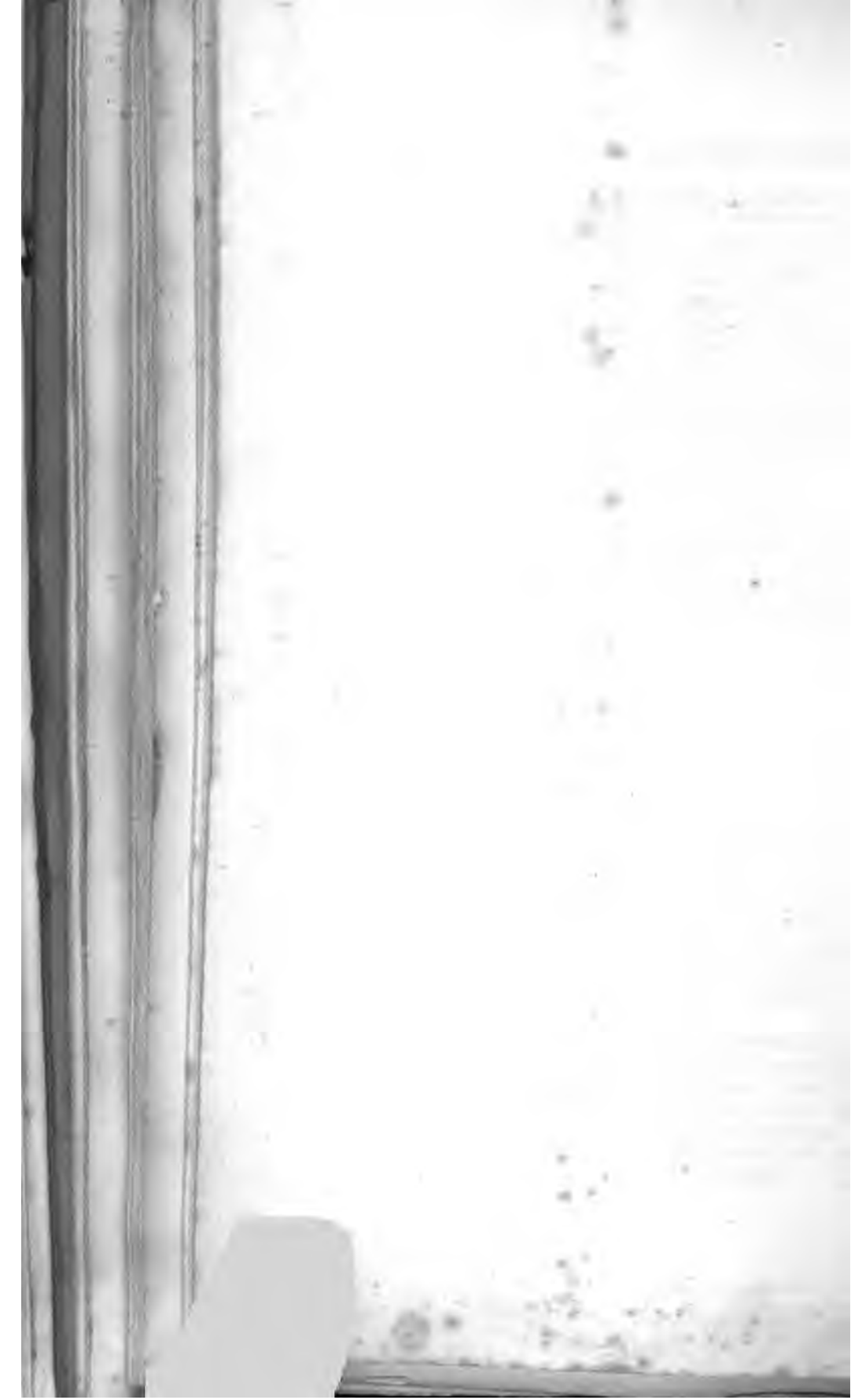
Kaiyuks are flat-bottomed, 35 to 50 feet long, and 2 to 4 feet deep. They are able to carry as much as a thousand poods of cargo, and can accommodate 150 men. There are calculated to be several hundreds of these on the Amu. The boat owners are all Khivans. About 100 boats come from the Oxus into Kazalinsk every summer bringing grain, fruit, and timber, and from the islands of the Aral sea, limestone.

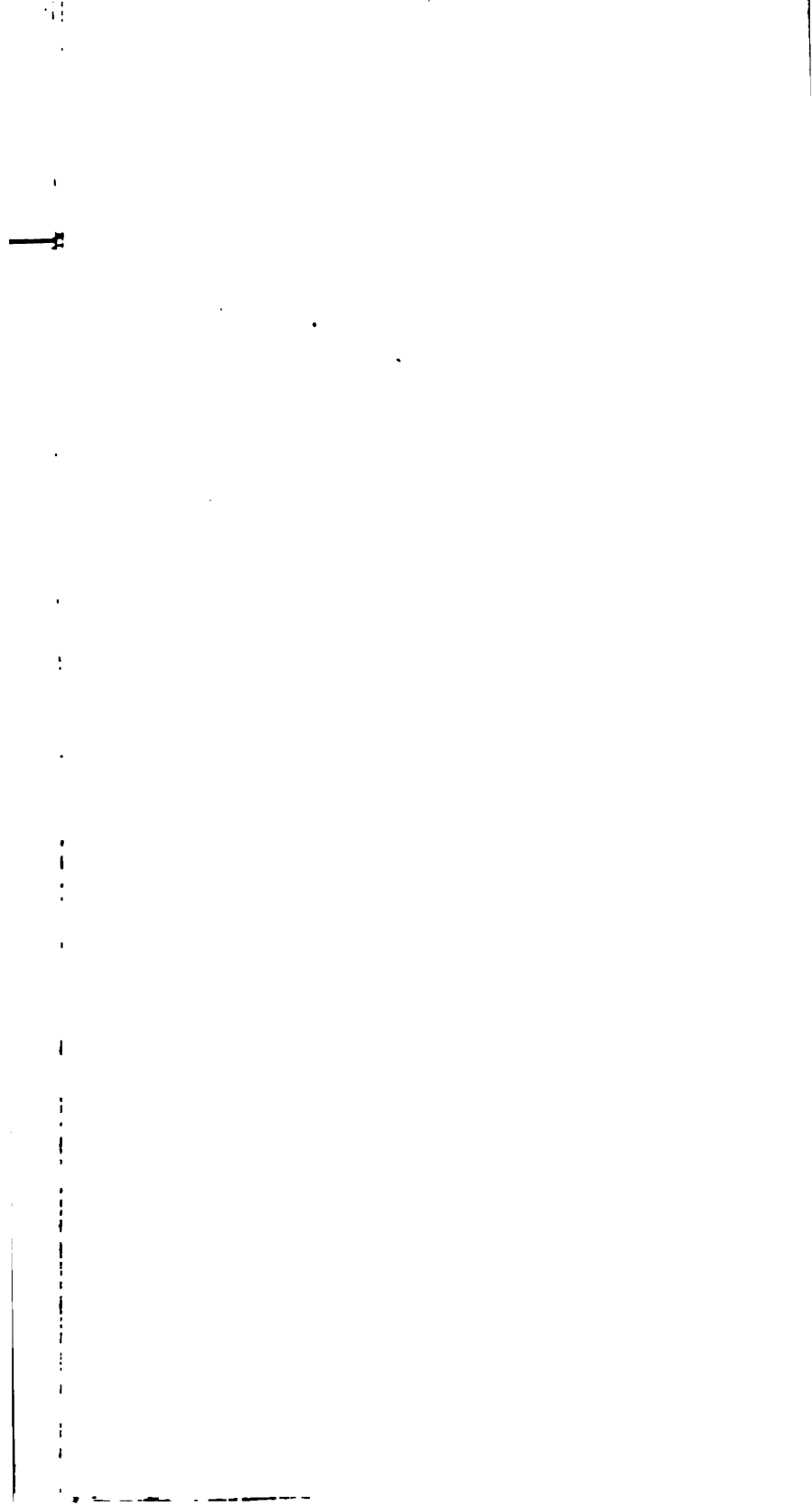
Generally speaking, however, navigation in the Turkestan country can only be said to be in its infancy.

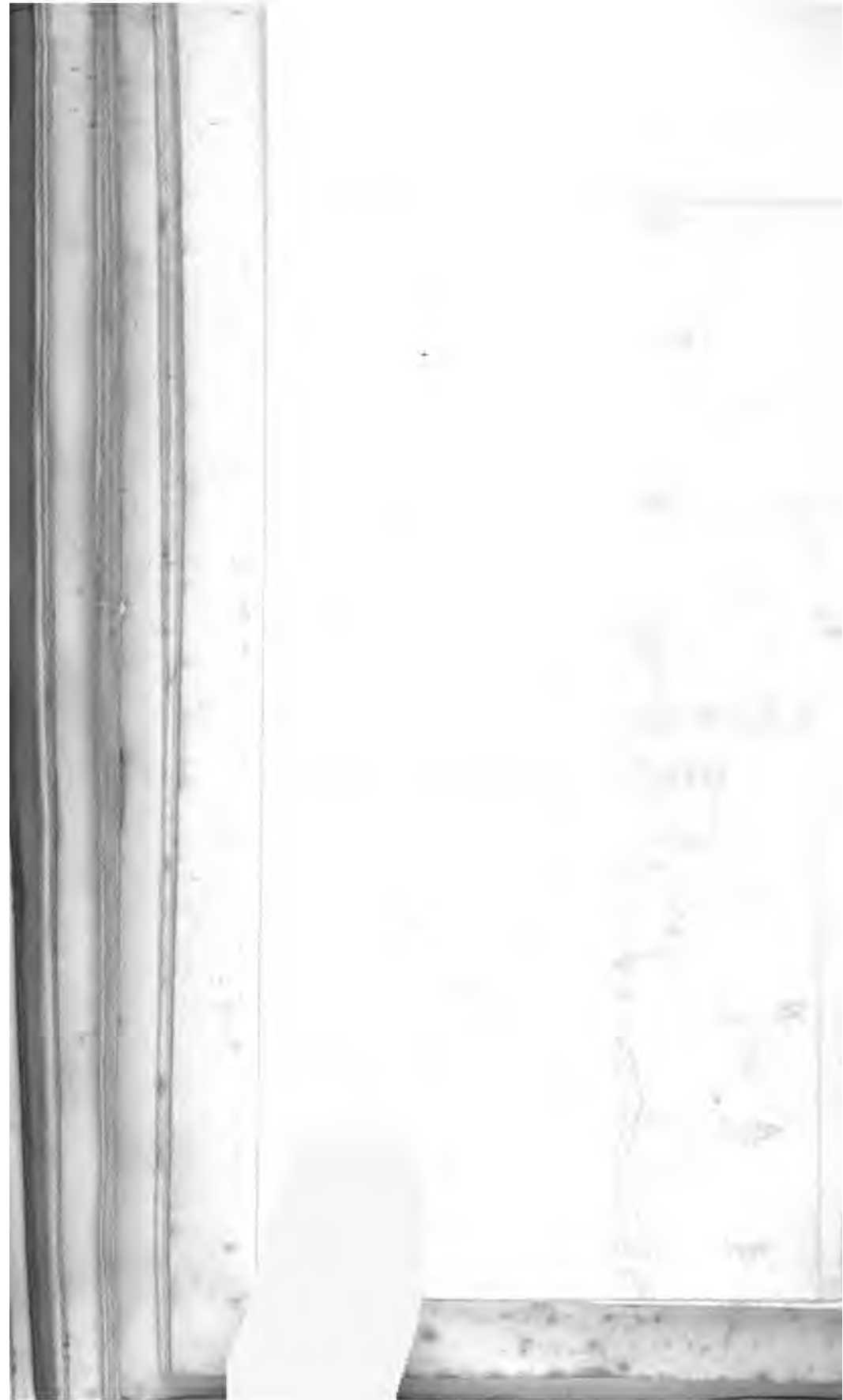
Although ferries across the Amu and Syr rivers are Fords, ferries, and very numerous,* there is only one bridge on bridges. these rivers besides the railway one at Charjui. This is a wooden one at Khodjend. The crossing is usually effected by means of barges or rafts, and the natives cross in their boats or on rafts made of rushes. In other parts of the country improvements in the communications have been carried out by the construction of the following bridges:—a wooden one over the Chirchik near Tashkend, one over the Talas at Aulia-áta, also wooden, and an iron bridge across the Bugun 64 versts from Chimkend.

The country (at Tashkend) is in telegraphic communication with European Russia at Orenburg through Telegraha. Kazalinsk, with Siberia through Fort Verni, with the Transcaspian province and Petro-Alexandrovsk through Samarkand, and with the Ferghana province through Khodjend.

* *Note.*—In the Ferghana province alone there are 15 government raft ferries across the the Syr Daria, the keeping up of which costs the state as much as 7,000 roubles a year.—*Author.*







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The Hon'ble Lieut.-General H. BRACKENBURY, C. B., in the Chair.

THE LAW of WARRANTY and SOUNDNESS of HORSES.

By Veterinary-Major A. E. QUERIPPEL, A. V. D.

PART I.

SALE AND WARRANTY.

This lecture naturally divides itself into two parts, *viz.*—1st, the legal portion bearing on the sale and warranty of horses, and 2ndly, unsoundness.

The first division is one that I fear may be somewhat complicated, but I shall endeavour, as I proceed, to give such illustrations as will explain my meaning. This portion cannot in any way be looked upon as exhaustive, as within the narrow limits of one lecture it would be impossible to touch upon all the legal points that so frequently occur.

The subject of warranty arises out of and in fact is an incident of the contract of sale, and in dealing with it, it will be necessary first to define the word 'sale.' In India we cannot do better than refer to the Indian Contract Act for the required definition which we find given in the following clear language. "Sale is the exchange of property for a price. It involves the transfer of the ownership of the thing sold from the seller to the buyer." Having then laid down a precise legal definition of the term 'sale,' we have next to explain how sale is effected; and here again we cannot do better than consult the Contract Act, bearing in mind that the word 'goods', wherever it occurs in that section, means and includes every kind of moveable property. As a horse is moveable property, the word 'goods' would include a horse.

Sale is effected we find.

(a) By offer and acceptance of goods for a price.

(b) Of a price ascertained goods tender with 1. payment of the price in full, or 2. a part payment in earnest money. (c) With an agreement that the payment or delivery or both shall be postponed.

Ancillary to the question as to how a sale is effected, is the important point as to when the property of the thing sold passes to the buyer.

The property passes to the buyer, in the case of a horse, when the whole or part of the price or when the earnest money is paid, or when the animal is delivered. But if the parties agree that the payment or delivery or both shall be postponed, the property passes as soon as the proposal for sale is accepted.

To better understand the above proposition it would be as well to give a few illustrations.

A offers to buy a horse from B for Rs. 600. B accepts A's offer and delivers the horse to A. The horse becomes A's property on delivery. Again, B offers A Rs. 1,000 for his horse, the horse to be delivered to B on a stated day and the price to be paid on another stated day. A accepts the offer. The horse becomes B's as soon as the proposal is accepted. Lastly, B offers A Rs. 1,000 for his horse on a month's credit: A accepts the offer. The horse becomes B's as soon as the offer is accepted.

Now the question may naturally be asked, What constitutes delivery? Delivery may be made by doing anything which has the effect of putting the thing sold in the possession of the buyer or of any person authorized to hold it on his behalf. Thus A sells a horse to B and causes it to be removed from his stables to B's: the removal to B's stable is a delivery.

Again, B directs A to send the horse to C, a livery-stable keeper or to a friend: the delivery to either constitutes a delivery.

A delivery to a railway company or carrier has the same effect as a delivery to the buyer, but in this case it should be noted that according to Indian law, such a delivery does not render the buyer liable for the price of the horse, if it does not reach him, unless the delivery to the company is so made as to enable him to hold them responsible for the safe custody or delivery of the horse.

Thus if B at Agra buys a horse of A who lives at Calcutta, to be sent to him by railway. A takes it to the railway station and leaves it there without conforming to the rules which must be complied with in order to render the company responsible. The horse does not reach B: there has not been a sufficient delivery to charge B with the price.

Then again, if a person bargains for a horse with A and desires him to keep the animal for a specific purpose for the purchaser, and A accepts the offer, it is sufficient delivery of the horse.

Thus A agreed to purchase of B a horse standing in his stable, at the same time asking him to have the horse shod and fed for that day, as the purchaser had not yet arranged for stable accommodation for

the animal: in this case the court held that there was sufficient delivery.

In this connection it may be mentioned that in the absence of any special promise, the seller of a horse is not bound to deliver it until the buyer applies for delivery, and it must be borne in mind that, unless otherwise agreed upon, a horse sold is to be delivered at the place at which it is at the time of sale.

The next matter to explain is what is meant by earnest money.

"It is", says Mr. Benjamin, "anything given by the buyer to the seller, and accepted by the latter, to mark the final conclusive assent of both sides to the bargain. It denotes something given, either as a sign of the bargain being struck or as an advance of a part of the purchase money."

Now having briefly described what constitutes a sale, and the component parts of that contract, we will next consider the subject of warranty, which is a branch of the contract of sale or rather is an element very often of considerable importance, and about which there is a good deal of popular misapprehension.

There is no definition of the term warranty in the Indian Contract Act, but it may be defined as a guarantee or security.

Warranties are of two kinds, express or implied.

An express warranty consists of every statement made by the seller at the time of sale, in relation to the subject of the sale, intended to be a warranty. When an express warranty is couched in technical terms, it is to be interpreted according to their technical signification, unless they be manifestly used in a different sense and differently understood by the buyer.

An implied warranty is that which is in certain cases presumed in law or inferred from circumstances. A warranty is implied in the following cases:—

- (1.) A warranty of title is presumed when the thing sold is at the time of sale in the possession of the seller, unless the contrary be expressed.
- (2.) Upon a contract of sale where the horse is supposed to be sold for a particular use or purpose, a warranty will be implied that the horse is fit for such purpose so far as it can be.
- (3.) A warranty will be implied against all latent defects in two cases, (a) when the seller knows that the buyer did not rely on his own judgment, but on that of the seller, who knew at the time or might have known the existence of the defects; (b) where from the situation of the parties, the seller might have guarded against the defects, or where a warranty may be presumed from the very nature of the transaction.

The first of these presumptions of warranty is emphasised in the Indian Contract Act; for we find it enacted that, if the buyer is, by reason of invalidity of the seller's title, deprived of the thing sold, the seller is responsible to the buyer for loss caused thereby, unless a contrary intention appears in the contract.

"This," says Cunningham in his edition of the Indian Contract Act, "is an abrogation of the old common law rule of '*Caveat emptor*' (let

"the buyer beware) ; and amounts to an affirmation of the
 "a man by the mere act of selling warrants his title to the

The other cases of implied warranty above referred
 special reference with the exception of case (3) above desc
 regard to these instances of implied warranty in English l
 be well to point out, that the law on this point is succin
 Sec. 116 of the Indian Contract Act, which is to this eff
 absence of fraud and of any *express* warranty of quality, th
 article which answers to the description under which it wa
 responsible for any latent defect."

I would particularly draw attention to the difference
 between English and Indian law.

Thus A sells a horse to B. It turns out that th
 at the time of sale a defect of which A was aware. I
 possible for this !! It will be noticed that this section i
 by any provision as to the buyer having an opportunity
 the thing bought.

Of course, if there has been any fraud or direct misr
 on the part of the seller, the legal consequences which
 and misrepresentation, when established by evidence, wi
 follow, namely the contract will be voidable and the v
 fraud can rescind the contract.

Fraud, according to the Indian Contract Act, means
 any of the following acts committed by a party to a contr
 connivance or by his agent, with intent to deceive anothe
 induce him to enter into the contract :—

- (1.) The suggestion, as a fact, of that which is not
 that does not believe it as true.
- (2.) The active concealment of a fact by one having
 belief of the fact.
- (3.) Any other act fitted to deceive.
- (4.) Any such act or omission as the law declares to l

The explanation to this section, however, mer
 attention and requires to be carefully cons
 dealing with the subject of fraud.

It runs thus—" Mere silence as to facts likely to affec
 "ness of a person to enter into a contract is not fraud, unle
 "stances of the case are such, that regard being had to th
 "duty of the person keeping silence to speak, or unless hi
 "itself equivalent to speech.

For example, A sells by auction to B a horse wh
 to be unsound. A says nothing about the horse's unsoun
 is not fraud on A's part. But if B says to A, "If you
 it, I shall assume that the horse is sound," and A says i
 the horse's unsoundness, then A's silence is equivalent t
 in the event of the horse proving unsound, A's fraud is
 and B may return the horse and recover the price.

Having explained what a fraud is and also wha
 warranty is, a few words should be added in respec

warranty. It is laid down that a general warranty does not extend to patent or obvious defects, which at the time are apparent on due inspection, or to defects which are known to the buyer. Thus a warranty will not bind a man in a thing that is apparent, as to warrant that a horse has both his eyes when he is manifestly blind of one of them.

It is, however, not necessary that the seller should say, "I warrant." It is sufficient if he says that the thing he sells is of a particular class or quality, or fit for a specified purpose.

It should be here pointed out that a breach of warranty and a misrepresentation in the legal sense of the latter are not synonymous terms, as they may at first sight seem to be. The former term differs from the latter in that a warranty must always be given contemporaneously with, and as part, of the contract, whereas a misrepresentation precedes and induces to the contract. There, difference in consequences or effect, is also marked, because upon a false representation the victim of the misrepresentation may elect to avoid the contract, return the animal purchased, and recover the price paid; whereas the consequences of a breach of warranty are different. These will be explained further on. It also must be borne in mind, that in cases where there has been legal misrepresentation or silence, fraudulent within the meaning of the Indian Contract Act, the contract nevertheless is not voidable, if the party subject to the misrepresentation had the means of discovering the truth with ordinary diligence.

It is also to be borne in mind that a fraud or misrepresentation, as distinguished from a breach of warranty, which did not cause the consent to a contract of a party on whom such fraud was made, does not render a contract voidable. It will thus be seen that it is necessary to keep in mind the difference between a misrepresentation or fraud, and a breach of warranty, the two terms being often popularly confounded.

From the above remarks the following reason for requiring a warranty of soundness in buying a horse will at once become apparent.

Oliphant in his well known work on the law of horses says, "The reason laid down for requiring a warranty of soundness in buying a horse is, that it is well known that they have secret maladies, which cannot be discerned by the usual trials and inspections, and that a warranty prevents the purchaser from being damnified by these latent defects, against which no prudence can guard."

And the late Mr. Youatt said, "A man should have a more perfect knowledge of a horse than falls to the lot of most men and a knowledge of the vendor too, who ventures to buy a horse without a warranty. But the same, *mutatis mutandis*, may very justly be said of a person who ventures to give a warranty on the sale of a horse."

If a buyer, however, means to protect himself from hidden defects, he must take a warranty, and he is not protected otherwise, unless he can make out fraud.

It is always well for all persons concerned to have the warranty in writing, and to refuse any representation the seller will not commit

to writing. "A written warranty," says Oliphant, "should comprehend not only soundness, freedom from vice, and also quietness, age if necessary; besides, if required for a specific purpose, such as for carrying a lady, drawing a carriage, use in the hunting field, the warranty should contain a guarantee of the animal's fitness for the said specific purpose. It would be also advisable to have inserted an agreement, in the written document containing the written warranty, on the part of the seller, to take back the horse and to refund the price in the case of there happening to be a breach of warranty. Of course unfitness for the purpose for which the animal was bought must be clearly proved."

We have discussed, in general terms, how a warranty express and implied is understood. It may now be a useful guide to point out a few cases which have been held to be warranties.

Thus if a man says, "This horse is sound," that is a warranty; and if a person at the time of sale say, "You may depend upon it, the horse is perfectly quiet and free from vice," this is also a warranty.

But if a person at the time of his selling a horse says, "I never warrant a horse, but he is sound as far as I know," this is a qualified warranty, and the buyer could only recover on an action for breach of warranty by proving that the horse was unsound to the knowledge of the seller.

Again, a person warranting a horse sound except for a kick on the leg, was held to give only a qualified warranty.

Then again there are such things as limited warranties. These are those in which a specified time is allowed, within which the purchaser must give notice of any breach of warranty. If he neglect to do this, he has no remedy, unless such condition has been rendered inoperative by fraud or artifice. Thus, if a horse is sold and warranted sound and six years old, and it is a condition that it shall be deemed sound unless returned in two days, this condition applies only to the warranty of soundness.

Again, if a warranty runs thus, "warranted sound for one month," this limits the warranty to continue in force for one month only from the date of sale.

A person may also limit a warranty of soundness of a horse, requiring it to be returned within a certain time, and if the purchaser fails to comply with the condition, he cannot recover on the warranty, although the seller may have known of the unsoundness at the time of sale.

These are of course only a few illustrations of the various kinds of possible warranties; time will not admit of the matter being more exhaustively dealt with.

We will now proceed to deal briefly with the remedies which can be sought in the case of a breach of warranty. Those which can be obtained in the case of fraud and misrepresentation have already been dealt with, as also the remedy secured by special contract entered in the terms of the document.

The law on the subject will be found contained in Sec. 117 of the Indian Contract Act, which runs as follows:—"Where a specific article, (say a horse), sold with a warranty, has been delivered and accepted, and

"the warranty is broken, the sale is not thereby voidable; but the buyer is entitled to compensation from the seller for loss caused by the breach of warranty."

For example, A sells to B a horse warranted sound. The horse proves to have been unsound at the time of sale. The sale is not thereby rendered voidable, but B is entitled to compensation from A for loss caused by the unsoundness.

Of course, where by the contract the purchaser has the power of returning the horse, or where the contract is rescinded by the purchaser with the consent of the seller, and the horse is returned within a reasonable time and in the same condition as that in which it was bought, the above section does not apply.

Where, however, there is a breach of warranty and no condition for rescinding the sale, the purchaser must keep the article and rely upon an action for damages, or upon a cross action, if he has not paid the price and is sued for its recovery. If a purchaser sue upon the warranty, he need not return the horse that he has bought.

PART II.

SOUNDNESS.

I now approach the second portion of the subject, *viz.* soundness; and this I do with diffidence for the following reasons:—

1st. Because it is one on which volumes could be written, and to so far condense it, as to meet the requirements of this lecture, and at the same time to make it intelligible, is I feel a matter of difficulty.

2nd. Because it is one embracing so many technicalities, that I fear in some cases to be misunderstood.

Let us for a moment consider the terms, unsoundness and vice. Much diversity of opinion has existed as to the proper interpretation of the term unsoundness, as some judges have held that temporary disease did not constitute such; but it has been ruled that the word 'sound' legally means sound or perfect; and Mr. Baron Parke laid it down that a horse warranted sound must be free from disease at the time he is warranted. The rule of unsoundness is, that if at the time of sale the horse has any disease which diminishes his usefulness so as to make him less capable of work, that horse is unsound. Such disease may be either congenital, or may have arisen subsequently to birth, or may be the result of an accident.

The term, 'natural usefulness,' may require explanation. One horse has great speed, but is soon knocked up; another may go all day, but this only at a snail's pace; one with a heavy forehand is likely to stumble; again a horse with an irritable disposition will fall away in

condition. The term unsoundness cannot be applied to these, as the purchaser should ascertain whether the horse is likely to suit him both as to strength and powers of endurance, as well as to his manner of going.

To demonstrate that the term, 'natural usefulness,' is implicitly relied on legally in the interpretation of the word, 'sound,' I would mention that it has been laid down that should a horse suffer from a pimple on any part of the skin not touched by saddle or harness that horse is sound; but should this occur, say under the saddle, that horse would be unsound, as it would lessen his natural usefulness.

In a court of law, if a disease is easily cured, this does not render the horse sound, but only goes towards the mitigation of damages.

Let us now enquire what is a vice. A bad habit, to constitute a vice, must be shewn in the temper of a horse, so as to make him dangerous or to diminish his natural usefulness, or it must be a habit decidedly injurious to his health.

And now we proceed to enumerate the most common causes of unsoundness in the horse: to enumerate the whole would be beyond the province of this lecture. I have deemed it more advisable to commence at the head, as I would do were I examining a horse, than to proceed alphabetically with the diseases as is so frequently done.

If you would wish to become proficient in the examination of horses, I would urge upon you the necessity of adopting a method and never to deviate from it: in this way you will never miss a point. You must,

- 1st. See a horse in the stable.
- 2nd. Feel his various points on level ground.
- 3rd. See him in his various paces.
- 4th. Try his wind.
- 5th. Remove fore shoes, if necessary.

I would recommend all intending purchasers to look as long as possible at a horse in the stable: much is there to be learnt. You may see him crib-bite, wind-suck, or weave, all of which are vices. Again, you may see him rest one leg, and this would naturally lead you to examine this one when you bring him out. I would, however, warn you that a horse will occasionally point one fore foot through laziness, but in this case he will always advance the opposite hind one.

We now bring the horse out, and in doing so a snaffle bridle should be used. In leading him out we halt at the stable door to examine his eyes: this we do with the aid of something black, in order that there should be no reflection of any object on the eye itself. What then should be looked for? Cloudiness of the eye. This may be but temporary, arising from a cold or a blow: still it constitutes unsoundness until entirely removed.

Cataract. This is seen in the lens behind the pupil, and if in an advanced stage is easily recognized; but when only small, it is likely to be overlooked: still never mind how small it is, it constitutes unsoundness. I would, however, guard you against blaming the seller, when a cataract is seen shortly after purchase, as it may come on very suddenly.

We now proceed to examine his head, assuring ourselves that the horse is not suffering from any wound on the poll.

We examine his mouth carefully, to discover whether there is any peculiarity with his teeth: we may find that he is parrot-mouthed or undershot, or his teeth by being much worn may be evidence of his being a crib-biter. Crib-biting will eventually lead to indigestion and loss of condition: then it becomes unsoundness. Prior to any such change occurring it is a vice, being a habit decidedly injurious to a horse's health. Wind-sucking is also a vice. Should we find that he is suffering from *lampas*, which is a swelling of the bars of the hard palate, we can satisfy ourselves that it is but a temporary unsoundness.

In examining the mouth, we should look carefully behind the incisor teeth on the lower jaw, to see whether there are marks of injuries, as this would point to the horse being a puller, amounting at times to bolting: this being a bad and dangerous habit constitutes a vice.

We then examine the nostrils to see whether they are capacious, as on this will depend the staying powers of the horse: anything that may occur to render the passage of air difficult constitutes unsoundness. The lining membrane of the nostrils will indicate the state of health, and I counsel you against purchasing a horse with a cold, unless under a special warranty, as it may leave evil results behind it whereby a horse may become a whistler or a roarer. I should, whilst alluding to the nostrils, remark on that most dreadful of all diseases, *viz.* glanders, a scourge as far as the equine race is concerned, but as being readily communicable to mankind still more to be feared. This being an incurable disease constitutes the worst form of unsoundness.

The space between the branches of the jaw should be large to allow room for the top of the windpipe, and also to allow of the proper bend of the head. Should the glands be enlarged, this would constitute unsoundness either temporary or permanent.

We then examine the neck. There we may find that the horse is what is termed ewe-necked, and that consequently he is a stargazer: these being defects of conformation do not constitute unsoundness.

I now purpose taking you down the fore leg. We should first compare both fore legs, remarking carefully any difference that may exist between them, especially so at the shoulder, as either from actual disease of the part or from the fact that the horse has rested the limb for a lengthened period owing to some injury to other parts of it, we may find wasting of the muscles and consequent unsoundness.

The elbow will require but little examination, except that I would recommend you to carefully consider whether the horse you intend to purchase is badly tied in at this joint.

With reference to broken knees we must carefully examine the parts, raising the hair to ascertain whether there are the slightest marks, for although it has been ruled that broken knees do not constitute unsoundness unless they interfere with the action of a horse, still they materially affect his value.

The leg downwards will now demand our attention, and amongst the most common diseases may be mentioned that of splint. The rulings on this point are vague; of course, if lame or tender at the time of sale, this would constitute a breach of warranty, but if sound and that the

splint is so placed so as not to interfere with the back tendons, this would not constitute an unsoundness.

Our special attention is now called to the back sinews. Should we find them knotty or thickened, we can have no difficulty in determining that the horse is unsound, as some alteration in structure has taken place.

We should carefully look at the fetlock joint, to satisfy ourselves that the horse has not been overworked. This generally shows itself in the way of windgalls, but as they do not of themselves cause lameness nor interfere with the action of a horse, they cannot be said to constitute unsoundness.

I now will ask you to follow me to the pastern, and will further ask you to compare them both, and should you be able to detect the slightest difference between them, you may rest assured that the animal is suffering from ringbone, the slightest appearance of which, whether it produces lameness or not, must be considered an unsoundness.

The foot now claims our attention, and I approach this portion of the subject with the utmost diffidence, for sufficient matter could be found for a whole lecture instead of forming, as it must do, but a portion of the present one. I feel I can now only allude to those diseases which are most apparent, and which will guide you as to the selection of a suitable horse or the rejection of a useless one.

First we must satisfy ourselves that they are alike. If one is smaller than the other, we must ask ourselves whether it is the result of former disease which may lessen the usefulness of the horse, or whether it is from some disease which exists at the time of examination and which will render the animal useless.

First examine the wall and see whether there is a sandcrack, for never mind how small it is, it constitutes unsoundness. As it usually commences from the coronet, we should lift the long hairs on that part to ascertain whether an incipient crack exists. I might mention that when seen in the fore feet it occurs on the inner quarter, and in front on the hind feet.

When any portion of the coronet has been injured, for example by a tread, horn is not properly made, and consequently the horse suffers from what is known as a false quarter, which must be looked upon as an unsoundness.

With reference to the wall, should we find that it is affected with diverging rings, we may suspect that the horse has suffered from an attack of *laminitis* or fever in the feet. This opinion will be confirmed if on examination of the sole, we find it to be 'pumiced,' by which is meant a bulging of this part at the toe: this is decidedly an unsoundness.

That disease known as *navicular*, and which has to be recognized more by negative than by positive symptoms, renders a horse unsound. To relieve this disease the nerves above the fetlock are severed. This may cause the lameness to cease and the horse may go well for years; still there is no certainty of his continuing to do so, therefore we should look carefully for marks of 'nerving,' and if found, we would have no hesitation in rejecting the animal as unsound.

Thrush, by which is understood a fetid discharge from the frog, has been ruled to render a horse unsound.

Flat soles arise from three causes, (1) Paring with drawing knife, (2) *luminitis*, (3) congenital. According to cause and degree this may either be unsoundness of the greatest moment, or not.

The flatness may either be a slight want of concavity, or may be an actual convexity: any horse with a flat sole that goes tender is unsound. Seedy toe very often follows; therefore tap the front of the foot with a hammer to detect whether it is hollow or not. Toes turned in or out do not constitute unsoundness.

Brittle hoof is unsoundness, if it will not allow of nails being driven.

Surmounting the heels are two pieces of yielding cartilage to give elasticity to the back parts of the foot: these are at times converted into bone, and whether they cause lameness or not render a horse unsound.

When the examination of a horse is finished, we remove the shoes and search for corn, which shews itself as a red spot in the angle between the inner bar and the wall: corns constitute unsoundness.

We must take a cursory glance at the body, noticing any galls or other things which may lead to uselessness through interference of the saddle or harness, bearing in mind that even a pimple, if so placed, will legally render a horse unsound. We must also ascertain that the animal is free from ventral hernia, which shows itself as a tumor on the side of the abdomen, and further that there is a freedom from warts or *bursatti* ulcers in those parts where they would interfere with the usefulness of the horse.

It now remains for us to examine the hind leg, and we first stand behind to see that the quarters are symmetrical. Here you may find evidence of fracture of the points of the hip: this would constitute unsoundness in a legal point of view, but the horse so suffering would be perfectly serviceable.

We now proceed to examine the stifle, which is frequently the seat of injury, but as it always causes lameness, we would not be called to examine such a horse. I would, however, advise you always to look carefully on the inner side of the thigh, to ascertain that there is no mark shewing that the animal has lately been kicked. At this part the bone is only covered with a skin, and a sharp blow is likely to cause a fracture, which having occurred without displacement, is sure to mislead you.

The hock next will occupy our attention, and to better explain it, I shall divide the points to be looked for as follows:—

1st.—Bursal enlargements, being of the same nature as windgalls.

2nd.—Disease of the bones.

3rd.—Disease of the ligaments.

In the first class we must note bog spavin, which shews itself as a large soft enlargement on the front of the hock. In well shaped hocks this is frequently seen without lameness, but in straight upright hocks it is accompanied by heat, and does cause the animal to go lame. In either case it must be looked upon as unsoundness. Running on the inside of the hock is a very large vein which, owing to the pressure of the

enlargement of leg veins because varicose: this is a blood sprain. It cannot be looked upon as a disease per se of the blood enlargement, we shall get rid of the varicosities the vein.

In this class also we find that disease commonly known as *grip*. This is seen at the neck and at the lower part of above the hock: the enlargement, which is soft, increases in size. It is evidence of work, but when accompanied by lameness, I would not look upon it as unsoundness.

Capped hock, if caused by actual amount of labor, is not to be looked upon as unsoundness; if from the hock soundness a vice. If, however, capped hock is accompanied with lameness, it arises from a sprain, and would then render a horse unsound.

In the second class we must consider sprains proper: I might mention that it causes more lameness when placed when situated behind, but whether accompanied by lameness or not is an unsoundness.

Curb, as being a sprain of a ligament, comes in the first class of this subject. It is seen as an enlargement at the back of the leg about 3 or 4 inches below its point. It is frequently the horse with curb, works sound—still legally it must be considered unsoundness, although a horse may be passed sound when curbed, provided a special warranty is given.

We need not re-capitulate the diseases of the remainder of the hind limb, as we have already carefully considered the leg. We must, however, bear in mind that whereas splints, disease, and laminitis, mainly affect the fore legs, ringbone affects the hind.

It now only remains for us to examine the horse. First we satisfy ourselves that he is not broken-winded: recognized by the peculiar respiration, inspiration being easy, whereas expiration is a matter of difficulty, being performed with great efforts. This can be plainly seen by observing the flanks; cough which accompanies this disease is well known to all.

We now gallop the horse to detect roaring, whistling, or galloping. I do not wish to be understood that the horse is pushed until he is fit to drop, as I frequently see done. A gallop will determine whether he is sound in wind or not; roaring and whistling constitute unsoundness.

It now only remains for me to point out a few of the diseases possessed by horses, which constitute vices.

Gibbing, being dangerous and as it lessens the use of the horse, is a vice.

Crib-biting and wind-sucking have both been ruled to be vices. Kicking either in the stable or in harness, being a dangerous vice, is a vice.

Rearing when unprovoked by the bit is also a vice.

Rolling. Some horses are inveterate rollers and are considered unsound in the stable. If an inveterate roller, this would constitute a vice.

Bolting and shying are bad and dangerous habits, and therefore both are vices.

A horse that can be proved to be vicious to clean or shoe is returnable on a warranty of vice.

Before concluding this portion of the subject, I would draw your attention to a definition of the word 'sound,' as given by Oliphant in his 'Law of Horses.' He says :—

"We may define a horse to be sound when he is free from *hereditary disease*, is in possession of his natural and constitutional health, and has "as much bodily perfection as is *consistent with his natural formation*."

You will find the words, "*hereditary disease*," and, "*consistent with his natural formation*," in italics in the printed copies before you ; and it is on these two points that I wish to offer a few remarks.

With reference to hereditary disease, there is scarcely a disease to which a horse is liable that is not hereditary. Take for example the progeny of sires or dams that have a bony diathesis, you will in all probability find them affected with splints, spavins, or ringbones, or with all three ; the same may be said with reference to brokenwind, roaring, and many other diseases.

It might be difficult to maintain a breach of warranty on the sale of a horse solely on the grounds of hereditary disease, but still it is just possible that should a horse develop a disease after its sale, which could be proved to be hereditary, that the purchaser might have his action ; and although no case can be traced as having been tried on these grounds in the horse, still a case was tried before Chief Justice Abbott having reference to sheep. It was one in which 50 of a flock died ten months after purchase, and evidence was brought forward to prove that the disease was well known to be due to "breeding in and in from relations," that it was a fatal disease, and no cure or prevention was known for it. Justice Abbott left it to the Jury to decide, "whether at the time of sale the sheep had existing in their blood or constitution the disease of which they afterwards died, or whether it had arisen from any subsequent cause." On this question the Jury returned a verdict for the plaintiff.

The second point I wish to draw your attention to is the expression, "*consistent with his natural formation*."

Take, for example—a horse is bought with toes turned either in or out, both of which formations are very liable to cause him to cut or brush, and although this may be a greater detriment to the horse than many kinds of unsoundness, causing the horse, as it frequently does, to fall suddenly, which may endanger the rider's life, still, if the wounds occasioned did not exist at the time of sale, the purchaser has no legal remedy against the buyer. This is a case to which the term '*caveat emptor*' particularly applies : the purchaser should have examined the horse, and should have ascertained that there was a liability to cut or brush, and should have either rejected the horse or should have taken a special warranty against it.

This will demonstrate how important the subject of conformation is to all who intend to purchase horses for themselves or to officers employed on remount duty. The whole question of conformation is one that

cannot be dealt with here, but I feel I shall be excused somewhat in order to shew the points of the hock which should be fully considered when buying a horse, especially a young horse, the shape of this most important joint will entirely depend on whether the animal will continue to work sound or not.

The hock requires most careful study on the part of the buyer. It should be clear and well defined, and should when the horse is at rest, be broad both above and below; the point should be well defined, all bones should be well developed, a narrow hock is a defect, it should not be placed too much under the body, neither should it be straight, nor should the hind legs be too far behind, much propelling power will be lost. When standing the hocks should be noticed whether the hocks are turned in or out; both are objectionable, and are indicative of weakness, and therefore a disease.

I feel I have introduced a subject somewhat foreign to the law of warranty, but it is so important that I trust I shall be pardoned as it bears upon the law of soundness in this way, that until we are satisfied on the conformation of this, the most important part of the horse, we are likely to purchase one faulty in shape, which will become diseased, and as has already been said, only our negligence or ignorance to blame, and can obtain no redress.

Gentlemen, I have endeavoured to lay before you as far as time would allow. I feel it is an imperfect description of an important subject, but if I have enabled you to detect any defect which would prevent your purchasing a horse, which ultimately would be useless to you, or if I have enabled you, who belong to the branch of the service, I allude to the Native Cavalry, to enable you to reject even one useless horse in any batch bought at the fairs, I shall feel myself amply repaid.

The Chairman brought the proceedings to a close by a vote of thanks to the lecturer. He said that he first met Major Queripel when he held veterinary charge of the Nile expedition, and when that which might be said in warfare was carried out, viz., the swimming of over 1,000 animals across a river like the Nile. General Brackenbury complimented the lecturer on the interest shown in his lecture by the audience, and referred to the unanimous way in which he had saved the veterinary class from coming forward and conducting it without cost to the State.

A GEOGRAPHY OF THE TURKESTAN COUNTRY.

(PART II.)

Translated from the Russian by Staff-Lieut. E. PEACH, I.B.

CHAPTER VII.

HISTORICAL GLANCE AT THE RACES OF TURKESTAN.

MOVEMENT OF THE RUSSIANS IN CENTRAL ASIA.

COLONIZATION.

HISTORICAL SKETCH OF THE RACES OF CENTRAL ASIA IN GENERAL AND TURKESTAN IN PARTICULAR.

From ancient times many different races of people have passed over Central Asia and especially that part of it which we call Turkestan ; the descendants of some of these nations remain to this day whilst others have long since passed away leaving no trace save in the province of legend and tradition.

The first people known to have existed here were the wandering "*Saks*" and *Scythians*, after whom came the *Persians*, who commenced to build towns and dig canals. To this period belongs the foundation of great cities such as Marakand and others, and is associated with the fabulous individual Afrosiab who is supposed to have ruled in Marakand and Tashkend. The Persians left descendants who are called the "*Tadjiks*." After the Persians came the *Greeks* under the leadership of Alexander of Macedon. The three years spent in Central Asia by this great monarch so deeply impressed themselves on traditional memory that even to this day his name lives in numerous legends and fables, and occurs in names of kishláks, groves and rivers. He also built many forts and cities, among them being the so-called town of Alexandria which was situated on the Syr-Daria river at the Begovat rapids, but which now no longer exists.

After the Greeks, the *Chinese* three times established their supremacy in Central Asia but on each occasion for a short time only.

With the appearance of Mahommedanism came hordes of *Arabs* spreading, with fire and sword, the faith of Islam among the heathens of Central Asia ; the people clung tenaciously to their ancient beliefs and blood flowed in streams. The Arabs brought with them the arts of reading and writing, science and civilization ; skill in founding cities, and raising large, handsome and enduring buildings. To this epoch belongs the commencement of the towns of Shahr-i-Sabz, Karshi, Bokhara and many others, and also the excavation of numerous canals. The Arabs have left traces of their descent in the country but to a very inconsiderable extent.

After the Arabs, the *Uzbeks* (Mongol Tartars) were masters of Central Asia and split up into various tribes was the *Kirghiz*, who, to this day represent such a percentage of the inhabitants.

Seeking renown, and space for their expanding power, Tartars penetrated into Europe and for two hundred years into Russia; to this period of their history belong the celebrated rulers Chengiz Khan, and Tamerlane.

The Uzbeks were originally heathens, but were Mahomedanism. Nearly all of them have remained in that from their race spring the reigning Khans both of Khiva. Last of all, in the 19th century, the *Russians* have been forced to occupy and bring peace to almost all Central Asia, a abode of terror and uncertainty, war and constant alarms.

MOVEMENT OF THE RUSSIANS IN CENTRAL ASIA

Russian attempts to open up communications with Central Asia commenced in the time of Joanna III, but remained vain until then Peter the Great conceived the idea of opening a trade route to India across Central Asia but this also was not successful. It has been reserved for us in the present century to carry out the Great Reformer.

The advance of Russia into the interior of Central Asia was retarded by the raiding propensities of the natives. The Russians used to make incursions over our Orenburg border, and carry off people into captivity. For the protection of the inhabitants, in 1845, Government built two forts in the steppe of Orenburg; the "*Ural*" fort (now the town of Irtysh) and the "*Orenburg*" fort (now the town of Turgai.) This quietude for about a year, at the expiration of which they recommenced. In 1846 the Russians raised the fortifications of Raecum on the Syr-Daria river. This had the effect of again quieting the Kirghiz, and at the same time strengthened the position of Russia on the Syr. At this time the most westerly fortified place was the town of Semipatalinsk.

In process of time new enemies appeared in the Kokandis who took upon themselves to interfere with our power on the Syr-Daria. With a view to the whole of our Kingdom being brought within our line of defence, where they could be maintained for the maintenance of peace, General Perovsky in 1853 made a movement along the Syr and built Fort No. 1, (Kazalinsk) the fortifications being abolished, and Fort No. 2 (Karmakchi.) The movement then advanced higher up the river and laid siege to the town of Ak-Mechet, which, after a stubborn resistance was taken and re-named Perovsk. Count Perovsky then returned leaving garrisons in all the newly established forts. Till then all was quiet. Then the Kokandis began again to trouble our subjects, necessitating another movement up the river for the protection of the country, the result of which was the surrender of

Fort of Yani-Kurgan and the founding by us in 1861 of the Fortifications of Julek.

The ill-success of the Kokandis in this direction forced them to confine their inroads to the Semirechia province, but here also the only effect was to make the Government advance its frontier to Kopal and Verni. Notwithstanding this however, the raids of the Kokandis increased in frequency and finally became so daring that Russian troops had to be moved against them first under the command of Colonel Zimmerman and then under Kolpakofsky. The glorious affairs of Uzun-Agach, Tokmak and Pishpek, in which the Kokandis were completely defeated resulted in the surrender to us of Tokmak and Pishpek. This happened in the years 1860 and 1861.

The occupation of Yani-Kurgan by the Orenburg detachment, and Pishpek, and (in 1862) Merké, by the Siberian detachment, left an unprotected space of 700 versts between our advanced posts, into which, as into open doors, raiding parties were able to penetrate and carry out their attacks unpunished, and in case of emergency mutual support between the two sections of our advanced line was impossible. This, together with the general warlike character of the Kokandis, compelled us to move forward the Siberian troops under Chernaëff to Aulia-ata, and the Orenburg detachment under Verevkin to the town of Turkestan. Aulia-ata was taken by storm by Colonel Chernaëff in 1864 and Turkestan by Verevkin in the same year, after which the fortress of Chimkend fell to the two detachments combined. In this manner the advanced line on the Syr-Daria was united to that of Siberia and the orders of the paramount authority were received for the formation of the Turkestan province under the Military Governorship of. Chernaëff who was promoted to the rank of General.

After the taking of Chimkend it became known that part of the garrison had fled to Tashkend; from whence, being joined by the forces of the Amir of Bokhara, they intended to advance against the Russians. In order to ascertain the true state of affairs, General Chernaëff in 1864 set out with a small detachment towards Tashkend but owing to insufficiency of numbers he was unable to capture the town and found himself obliged to retreat.

The following year, on the night of the 27th June, Tashkend

Taking of Tashkend, 27th June 1865. was also taken by storm and added to the dominions of Russia.

After the taking of Tashkend and Chinaz, Chernaëff was recalled to St. Petersburg, by command of the Emperor, to take part in a commission assembled to consider the question of the best mode of administering the newly-conquered country and General Romanofsky was appointed in his place.

In 1866 the hostile movements of the Kokand troops compelled General Romanofsky to advance against them, and Khodjend, Nau, Ura-tubé and Jizak were taken.

On the 13th June 1867, by order of the Emperor, the Turkestan province was detached from the Orenburg command and formed into the "*Turkestan military district*," and General K. P. Von Kaufman was appointed Governor-General and Commander-in-Chief of the troops.

The raids of Bokharan parties, often commanded by a man of rank showed plainly that the Bokharan Amir did not desire peace with us and consequently in the spring of 1868 General Kaufman marched on Samarkand the holy city of all the Mussulmans of Asia. Under a decimating fire the troops forded, breast-high, the streams of the Zarafshan river and on the first of May occupied Chupan-ata. The next day a deputation from the town of our camp and offered to surrender the city without a struggle. Kaufman lost no time in advancing and establishing a citadel. Katta-Kurgan fell on the 31st of May and towards the end of the month, the Amir of Bokhara sued for peace; peace conditions were concluded, and the newly conquered Zarafshan district was formed into the Zarafshan district.

The Amir of Bokhara, understanding that it was impossible to contend with the Russians, completely submitted himself to them. It remained only the Khan of Khiva who, surrounded on all sides by sandy wastes, still reared his head proudly and continued to encourage the neighbouring Kirghiz to attack us, supplying them with money and sometimes even sending out his own military expeditions. In order therefore to teach the Khivans a lesson, in the autumn of 1875 military operations were commenced by General Kaufman. It proved to be one of the hardest of all our Central Asian campaigns. The detachment had to march through sandy, almost waterless, almost uncovered, for the most part, with shifting sands (Bakhshtan) and horses, and camels perished in the attempt to accomplish the march; by day the heat reached as much as 45 degrees. All difficulties however were finally overcome and on the 1st of August a series of attacks by the Khivan cavalry, the troops arrived at the town of Khiva. Here General Kaufman was met by the Amir offering the surrender of the town. After this the submission of the Turkoman steppes of Trans-Caspia was also effected. By the conclusion of peace with Khiva the whole of the right bank of the Amu-Darya was ceded to Russia and the Amu-Darya section was thus formed.

At 2 A.M., on the 7th August 1875, intelligence was received from

Capture of Kokand.

On the 7th of August Tashkend of an attack by the Russians on our frontier kishlaks of the Fergana district and the same morning troops were sent out, both to the valley and to Khodjend so as to advance on the enemy from the north. Having repulsed numerous attacks by the Kokandis, the troops of the Amir Makhram were captured, and, without a struggle, the town of Kokand, the capital of the Khanate. After this, disturbances in the Fergana compelled us to move still further forward and the towns of Namangan, Andijan and many populous kishlaks were taken. Recognizing the fact that the Kokandis were not capable of defending their country without disturbances, and in deference also to those of the people wishing for peace, the Emperor decided on the incorporation of the whole of the Khanate of Kokand into the Russian Empire.

Annexation of the Khanate of Kokand and for its dominions and for its capital, Kokand, 1876. what is now the Fergana district. This annexation took place in 1876.

After the pacification of the Turkestan country there still remained a great many natives dissatisfied with their lot and with the new order of things. These fled in large numbers over the Amu Daria into the Kizil-Kum deserts preferring to undergo all privations and dangers rather than give up their personal freedom. Hither came also Khivans and Bokharans, inhabitants of the Ferghana valley and Samarkandis. Many of these refugees perished from want and sandstorms, but many also survived who, forming themselves into bands, maintained themselves by raids, either on the Persians, or their own kinsmen the Turkomans who living on the banks of the Caspian, were our subjects. The conglomeration formed by all these exiles received the denomination of "*the new tribe*" (Akhal-tekke, or Tekkes) and their steppe surname was "*Alamani*."*

The effect, in the steppes, of the ill-successes of the Bokharans at Ura-tubé, Jizak and Samarkand, and of the Khivans at Khiva, appeared in the increased frequency of attacks on the peaceable Turkomans on the Caspian littoral, where, in 1869, we had constructed a fort at Krasnovodsk and, later, one also at Chikishliar. These Turkomans being thus under our protection, troops were despatched from the Caucasus to the eastern shores of the Caspian under General Stolietof. As, however, between Krasnovodsk and the nomad Tekkes there stretched a hundred miles of barren, waterless, desert covered with shifting sands, insupportably hot in summer and fearfully cold in winter, these latter paid but little attention to our threatening movements and continued their forays, among the Turkomans and Persians, and even on the banks of the Amu Daria, so that they became a burden to their neighbours who, however, were totally unable to resist them.

On numerous occasions the Russians attempted to persuade the Tekkes to give up their raiding propensities but to no purpose and at last in 1879 General Lomakin appeared with his troops and demanded the cessation of this indiscriminate plundering. The reply of the Tekkes was brief—"Come and subdue us."

And in truth it appeared that we must really go and subdue these turbulent spirits and annex the fertile strip of country they lived in. But how? Heat and cold and frightful deserts, scarcity of food and water, and a numerous enemy had to be encountered and thus affairs dragged on till the year 1880 when it was decided to construct a railway and the command of the Krasnovodsk troops was entrusted to General Skobelev.

Six months passed in preparations for the advance; camels, medicines and stores of all kinds had to be collected and it was not till December that our troops, in the slushy sticky mud of the rains, made their appearance among the Akhal-tekkes under the walls of their threatening fortress of Geok-tepe, 362 versts (241 miles) from Krasnovodsk.

The entire population of the Akhal-tekke oasis had taken refuge within the walls of the fort. Our men began to raise earthworks and dig trenches and a regular siege was commenced, which, in view of the determined resistance of the defenders, could only be ended by the capture of the place by storm.

* NOTE.—"Alaman" signifies a raid or border foray.—Transl.

After a series of small sallies and skirmishes from both sides, everything was prepared for the final attack on the 11th of January 1881. On the morning of the 12th the order was given to blow up the ramparts of the fortress.

The besieged expecting an assault had lined the walls in crowds. A frightful explosion followed and thousands of bodies were hurled into the air. Through the breach that was formed, storming parties forced their way into the fortress and a desperate hand-to-hand fight took place. Each individual "kibitka" had to be taken by force, men, women, old men and children joining in the defence; the ground was literally strewn with human bodies and dead horses but by evening all was over; Geok-tepe was taken and the Russian flag floated from its walls.

The Tekkes who escaped with their lives fled to Askhabad and from thence tendered their submission to the Russian Czar. The assault of 12th January put an end for ever to the raiding and independence of the Akhal-tekke Turkomans and they became enrolled in the numbers of Russian subjects.

In 1884, the Mervees, under the influence of accounts that reached them of the power and fame of Russia, and of the immunity from peril enjoyed by those living under her rule, of their own accord tendered their submission and sought Russian protection. Out of the lands of the Tekkes, and, later, those of the Mervees, was formed in 1885 the Trans-Caspian province and the railway was continued to Samarkand.

Thus was perfected and completed the Russian advance in Central Asia. We have there now peaceful and industrious subjects; our territories are rounded off and protected by natural boundaries and we no longer suffer from rapacious bands of marauders. Although the country seems poor it possesses in reality, a fruitful soil and the germs of wealth within itself. Peaceful people are now able to go about their avocations undisturbed by any danger of rebellion, robbery or raids, and if any one from without has the temerity to molest us we shall know how to defend our country, her honour and renown.

THE POPULATION OF THE COUNTRY.

The last race of people who came into the country were the Russians or "great Russians." They are scattered throughout the towns and villages to the number of 110 thousand including the troops. In addition to the latter, the clergy, officials, merchants, traders and peasants make up the total. Although, as compared with the natives, the Russians are few in numbers they are, nevertheless, all powerful by reason of their education, civilization, their organization, and the beneficent influence which they exercise for the good of the former. In proof of this may be instanced the disappearance of blood-feuds and the cessation of murders, robberies and pillage, the perpetrators of which now, instead of, as formerly, meeting with approbation and respect, are prosecuted by law as common thieves and rascals; man-stealing for slaves is no longer known and inter-tribal disturbances are rendered impossible. Finally, education is spreading and the safety of individuals is assured.

Recognizing these benefits the natives are bound to confess that for all of them they are indebted to the Russians.

The peasant section of the Russian community are engaged in agriculture, and the more intelligent classes in the export and import trade, and commerce.

The original inhabitants of the country are the "*Tadjiks*," speaking Persian, and the "*Galchas*", dwellers in the mountains. Together they number about 300,000 and are settled principally in the valleys of the Angren and Chirchik rivers, the towns of Khodjend, Ura-tubé, the Zarafshan district and the Ferghana Valley.

The Tadjiks are traders, merchants and agriculturists; the Galchas—agriculturists and cattle-rearers only. Both are Mussulmans of the "Sunni" sect.

The "*Uzbeks*" in the country are calculated to number about 350,000. They are found mostly in the Zarafshan and Khodjend districts and the province of Ferghana. They are divided into a great many tribes the number being variously estimated at from 32 to 96. The Uzbeks consist of nomads and settlers; the settlers dwell in the towns and "*kishlaks*" and are not distinguishable from the Tadjiks either by religion or customs or dress, or in any way except by their language.

The nomad Uzbeks may be called Kirghiz; their occupation is cattle and sheep-rearing, and, to a small extent, agriculture.

The Uzbeks, who have always exercised a powerful influence over the Tadjiks have transformed a section of them into the so-called "*Sarts*;" they are a sedentary people of Tadjik origin but speaking the Uzbek language. The Sarts are the most numerous of all the settled population of the country their numbers being calculated at 650,000; they live, without exception, in the towns and are to be found in nearly all those of Turkestan occupying themselves with trade and agriculture. The towns in which the Sarts are most numerous are Tashkend, Kokand, Margilan, Namangan and Andijan.

Smaller sections of the sedentary population of the country are:—

The *Kuramins*, 78,000; agriculturists inhabiting the Tashkend district; and *Karakalpaks* 76,000, in the Amu-Daria section, part of Kazalinsk district and the Ferghana province. They are all corn-growers and are remarkable for their poverty and low state of development.

There are other settlers in the country also who must be taken into account in the description of the population; such are:—

<i>Turks</i>	5,500.
<i>Kipchaks</i>	3,000.
<i>Persians</i>	3,000.
<i>Arabs</i>	3,000, in the Samarkand province.
<i>Turkomans</i>	7,500, in the Amu-Daria section.
<i>Dunganis</i>	16,000, in the Syr-Daria & Ferghana provinces.

<i>Tartars</i>	16,000,	} Scattered throughout the various towns.
<i>Jews</i>	6,500,	
<i>Gipsies</i>	1,000,	
<i>Hindoos</i>	1,000,	

The numbers of the Nomad Kirghiz, and their relations the Kara Kirghiz, in the north and north-west, are calculated at 871,000; hence the total of the population of the country at the present time of both sexes and all classes reaches to $2\frac{1}{2}$ million souls.

The inhabitants of the country are settled very unequally; in some places the land is densely populated and in others so thinly as to be almost said to be uninhabited. If the people were distributed evenly over the whole surface there would be about 5 to the square verst; as it is, in the Samarkand district for instance there are 27 to the square verst, while in the Shurakhan subdivision the population does not reach a proportion of one to the square verst. Even the most densely populated districts, however, where the proportion is 27 to the square verst, are not nearly so populous as certain districts in European Russia; as for instance the Moscow district where the proportion is 50 to the square verst. The Turkestan country, therefore, must be counted among the sparsely populated.

CHAPTER VIII.

ADMINISTRATIVE DIVISION OF THE COUNTRY. EXTENT. CHIEF TOWNS AND PLACES OF INTEREST.

For military purposes the Turkestan country is comprised in one Military District (*Voyenni Okrug*). The Commander-in-Chief of the troops and head of the whole country is the Governor-General.

Ecclesiastically the Turkestan military district is connected with the province of Semirechia. Place of residence of the bishop—the town of Verniye.

For administrative purposes the country is divided into different provinces (*oblasts*), each of which is placed under a Military Governor, and these are sub-divided again into districts (*uyezds*) under persons called “superintendents of districts.” Thus the whole country is administratively divided as follows:—

1.—The *Syr-Daria* province (with which is included the *Amu-Daria* section (*otdel*)).

2.—The *Ferghana* Province.

3.—The *Samarkand* Province.

a. The Syr-Daria Province is divided into five districts. These
Syr-Daria Province. with their approximate areas are as
follows :—

1.—Aulia-ata District	30,133 square miles.
2.—Perofsk	46,988 „
3.—Kazalinsk	26,466 „
4.—Chimkend	40,455 „
5.—Tashkend	14,266 „;

Total extent of the Province... 158,318 „

b. The Ferghana Province has also five districts. The total extent
Ferghana Province. (not including small dependencies con-
nected with it) is 36,014 square miles.
The districts are :—

1.—Osh	11,213 square miles.
2.—Margilan	6,240 „
3.—Andijan	5,917 „
4.—Kokand	5,870 „
5.—Namangan	6,774 „

c. The Samarkand province consists
Samarkand Province. of four districts.

1.—Samarkand	7,208 square miles.
2.—Katta-Kurgan	3,093 „
3.—Jizak	8,466 „
4.—Khodjend	4,667 „

Total of Province... 23,434 „

d. The Amu-Daria section is divided
Amu-Daria Section. into two sub-divisions (*uchastki*) :—

1.—The Shurakhan	22,444 square miles.
2.—The Chimbai	14,578 „

Total extent of the section... 37,022 „

Hence the total extent of the Turkestan country is about 254,786
Total extent of the country. square miles.

The greatest length is from north-west to south-east, from the post
station of Terekli to the town of Osh 1,665 versts or 1,110 miles.

TOWNS AND PLACES OF INTEREST—SYR-DARIA PROVINCE.

Tashkend, the chief town of the Syr-Daria province and of the whole
country, is situated in the valley of the

Tashkend.

Chirchik river, on the canals Boss-su,
Chauli, and Salar. It is the place of residence of the Governor-General as
well as of the Military Governor of the Syr-Daria province, and here the
whole administrative Government of the country is centred.

Tashkend is divided into two towns ; the Russian, or new Tashkend, and the Sart's quarter, or old or native Tashkend.*

The precise date of the foundation of old Tashkend is unknown but the town is undoubtedly very ancient as it is known to have been in existence in the eleventh century. According to the traditions of the people, Tashkend was formerly situated, not where it now is, but on the road to Chinaz at a spot where there is now a "kishlák" called Iski-Tashkend. The washing away, by the Chirchik, of the river bank on which the town was built was the cause of the removal of the inhabitants to the present site.

The town is surrounded by a high mud wall in which there were, formerly, twelve gates ; for purposes of administration it is divided into four sections, or quarters, each of which has its own mosque, schools, medresse &c. The people are settled in the different sections according to their occupations ; thus the agriculturists are all to be found in one section, the weavers in another, and so on.

The following are the sections of native Tashkend ; (1) the northern—*Kukchin*,—situated on undulating ground intersected by deep ravines and possessing numerous gardens. The chief occupation of the inhabitants is hide-dressing and tannery. (2) The eastern,—*Sibzor*—abutting on the Russian town and watered by the canal Keikaús flowing out of the Boss-su. In this section are the famous Medresses of Naurz-Mohammed, 240 years old, and Barakhan, 560 years old, the oldest Medresse in Tashkend. The chief occupation of the inhabitants of this part is weaving, dyeing and shoe-making. The shoes made here find their way to very distant parts of the country. The richest class are the wholesale merchants. (3) The southern—*Shaikhantau*—is watered by the deep canal Ankhor. It contains the office of the administrative governor (mayor?) of the town. The inhabitants occupy themselves with iron-casting, saddlery and very largely with weaving mats and other materials. (4) The western—*Bish-agach*—section ; in this are the best gardens in Tashkend and the inhabitants are engaged in horticulture and brick-making. There are some interesting Medresses here *viz.*, Khwaja-Akhrar where the dervishes assemble to perform "Zikr," and Petshak from the lofty minaret of which, in the time of the Kokand rule, condemned criminals were hurled to meet their death on the stone paving below.

NOTE.—* All the towns of the Turkestan country are thus divided into the old, or native, and new, or Russian town. They are usually a continuation one of the other or in close proximity to one another. The external appearance of the native (sarts') quarter of a town in Turkestan is as follows :—houses built of sun-dried bricks surrounded by high mud walls ; no windows look on to the streets, but only the gates or low small doors. Narrow and crooked streets with numerous back slums and canals leading out of them, the latter being bridged by small culverts with very inferior supports. In autumn the towns are deep in mud and in summer swallowed up in the luxuriant vegetation of the gardens ; in the middle of the town is usually a covered bazar and at intervals there are open spaces surrounded by booths and stalls where all kinds of small wares are for sale. The Russian towns are constructed on a similar plan to those in European Russia, the only difference being the material of the houses which is clay, and very rarely, burnt bricks. A feature of the towns here is the abundance of vegetation and gardens.—AUTHOR.

In the town there are altogether 300 Mosques, 17 Medresses, 60 native schools, four Russo-Sart schools, 30 caravanserais, 6 large baths, 1,600 shops and about 100,000 inhabitants of both sexes.

Russian Tashkend from its broad straight streets and imposing public and private buildings is deservedly called the chief town of the country.

The roads are well made and lined with avenues of poplars and other trees. There are squares, gardens, hotels, a theatre, good hackney carriages &c., and in fact it is quite a European town only there is much much more vegetation than is to be seen in any town in European Russia.

In the centre of the town is the Constantine square from which the streets radiate in all directions like the spokes of a wheel. A large canal (the Chauli) flowing north and south divides it into two portions the western of which is the town of commerce and shops, thickly crowded with buildings and densely populated, while the eastern, or Trans-Chauli is laid out in villas and, on account of its pure air, is considered the best part to live in.

In Tashkend there are six orthodox Russian churches (four however being in buildings such as hospitals, schools &c.), and a chapel and cemetery; there are also the palace of the Governor General with very fine grounds, the palace of the Grand Duke, the head-quarter offices of the country, province and district, and the town council.

In the western half are the citadel, hotel, museum, two dispensaries, the theatre and hospital; also the usual schools (*gymnasias*) for both boys and girls.

On the out-skirts of the town there is an astronomical observatory and numerous country residences among which is distinguished that of the chief of the country.

District Towns.

Chimkend, captured 22nd September 1864; situated on the river

Chimkend.

Badam a tributary of the Aris; population 5,639. There is a small fort on

a hill commanding the town. In the town is a santonine factory.

Another town of importance in the Chimkend district is *Turkestan*, captured also in 1864.

There is a famous mosque here called "Hazrat;" it is built of burnt bricks and is remarkable for its size, the height of the cupola being 112 feet. A Mahomedan saint, Hazrat-Yassuv, is buried here and the Sunni Mussulmans consider it a very holy shrine. Formerly it was the resort of large numbers of pilgrims, the Khans of Bokhara themselves being among the number. The standard, and a large bowl of Hazrat-Yassuv are preserved in the mosque near his coffin.

Twenty-three versts along the road to Chimkend is a Sart village called *Ikan*. In this village in the year 1864 one *sotnia* of Ural Cossacks under the command of *Yesuül* (Captain of Cossacks) Seroff heroically defended themselves, for three days, against the attacks of overwhelming numbers of Kokandis nearly all of them laying down their lives and thus saving the town of Turkestan and its garrison. In the

same neighbourhood are the ruins of four formerly populous towns viz., *Sauran*, *Charnak*, *Sunak* and *Yani-Kurgan*.

Perofsk—founded on the site of the Kokand fort of Ak-mechet, captured by Count Perofsky—is situated on the right bank of the Syr-Daria river and obtains water also from a canal called Sarkaraina. An earthen embankment along the river is necessary to protect the town from inundation.

Perofsk carries on a considerable trade in cattle with the town of Orenburg; in the district is the small fort of *Karmakchi*.

Kazalinsk lies on the right bank of the Syr-Daria, and has a population of 3,939. It was founded in 1857 in place of the *Raeem* fortifications on the Aral sea.

Aulia-ata is situated on the left bank of the swiftly flowing Talas river at the place where it issues from the mountains and separates up into a number of small streams.

The only building of interest and antiquity in the town, is the tomb of Goor-khan (of the house of the Karakhanids) known to the natives as the "holy father," i.e., *Aulia-ata*, from whence the city received its name.

Although the bazaar of *Aulia-ata* is not large, a considerable amount of trade is carried on, the Kirghiz and Karakirghiz of the district bringing in their cattle and the Russian colonists corn and grain. There is an annual fair in the spring.

FERGHANA PROVINCE.

The Chief town is *Margilan* (new) situated on the river Margilan-sai and the irrigation canals leading out of it. The native town of Margilan is

14 versts north of the Russian. In regard to its buildings, both state and private, Russian Margilan is considered the foremost town of Ferghana and there is also a fine garden and nursery which supplies the province with trees; native Margilan is the centre of the silk industry, both raw and manufactured articles being exported. There are extensive mulberry plantations and a large bazaar.

District Towns.

Kokand was occupied by the Russians on the 8th February 1876. It is built on three ravines and three canals, (*Katti-sai*, *Kichki-sai* and *Kara-su*), flowing out of the river *Tule*. It is 13 miles from the Syr-Daria, is 160 years old, and is known to the natives as "Kokand the beautiful." The town is surrounded by walls (already partly in ruins) from 28 to 35 feet high and as much as 35 feet thick. There used to be 12 gates in the walls and the city was divided accordingly into 12 sections. Kokand was the capital of the Khanate of the same name and was made so in place of Andijan, the former capital, by Saür-Khan. There remain several interesting monuments of which the following are the chief.

The fortified palace (*Urda*) of the Khans on an eminence in the centre of the town. This was built by Alimkul Khan and came into our

hands from Kudayar Khan. It is a fairly large and lofty building of burnt bricks faced with a mosaic of tiles and surrounded by high walls.

Besides four mosques there is a Medresse in Kokand which is remarkable for its enormous size. It is called the Medresse of Madali Khan and is a lofty, two-storied building of burnt brick, square in plan (each side being 420 feet long) with towers at each of the four corners. The most interesting of the mosques is that of Omar Khan, which is famous for its beauty. There is a large and very clean bazaar in Kokand and a brisk trade is carried on in cotton, silk, fruit, wool, hides &c., and thousands of sheep change hands. There is a native cotton factory and Russian cardboard and oil factories.

Namangan is situated on two broad and deep ariks, the Khan-arik and Yangi-arik both of which receive their waters from the Syr-Daria; in the time of the Khans of Kokand, Namangan was famous for its production of guns and sword blades.

Other places in the Namangan district are:—*Chust*, an insignificant little town on the Kak-sarik river; *Almaz*, remarkable for the excellent quality of the apples grown there, and the populous and commercial kishlak *Kasan*.

Andijan, the former capital of the Khanate of Kokand is built on a canal about three versts from the river Kara-daria, in a very picturesque situation. There are 22,576 inhabitants. Andijan was taken by assault on 1st October 1875 and again on 8th January 1876.

Osh lies on the northern slopes of the Alai mountains and receives its water from two ariks leading out of the river Ak-bura. Osh enjoys the best situation and climate of any town in the country.

In the district is the fortress of *Gulcha* defending the entrance into the Ferghana Valley from the direction of Kashgar.

SAMARKAND PROVINCE.

The chief town of the province and district is *Samarkand*. This town is a very important advanced post in our Central-Asian dominions carrying on a very considerable trade with Bokhara, Khiva, and, by way of Kokand, with Kashgar. Samarkand is situated at the base of the southwestern slopes of the Chupan-ata heights, seven versts from the left bank of the Zarafshan river. The gardens to the north and east of the city are watered by the ariks Siobcha and Siob and those on the south by the abundant stream of the Dargam canal.

Places of interest:—Mosque and Medresse *Shahzinda* in which the descendants of Timur Leng (Tamerlane) are buried. The *Rigistan*. This is a large open space over a thousand yards square, in the native quarter, and represents the centre and heart of the town. Here in former times the orders of the Khan were proclaimed by heralds, and the people used to assemble to discuss the political affairs of the Khanate; even at the present day, the Rigistan presents a picturesque

scene of colour, life, and activity ; on three sides it is enclosed by the huge ancient Medresses of *Tilla-Kari*, *Shirdar* and *Ulug-beg* with their lofty minarets (now partly in ruins) from which the Mullahs cry the "Azan."

In the south-west portion of the city is the sacred tomb of Tamerlane called "*Goor-i-emir*." This is a large chapel surmounted by a cupola and divided into two rooms with marble floors and walls ornamented with verses from the Koran in gold. Beneath the floor of the second room is a vault in which is the actual resting place of the great conqueror, his teacher, and certain members of his family. Near the coffin are placed his standards and some books out of which the Mullahs read day and night.

The governor's palace and military club are handsome and imposing edifices. Well laid out streets and good shops give Samarkand quite the appearance of a European town and the railway has greatly increased its commercial importance. The chief trade is in silk, (both raw and manufactured) ; cotton, hides, fruit, rice, candied peel, horses and sheep.

District Towns.

Katta-Kurgan, on the arik Narpai, has a small citadel built on an elevated mound (*kurgan*). The best place in the town is "the Emir's garden."

Katta-Kurgan.

Panjikand is a large kishlák situated on the left bank of the Zarafshan at its place of issue from the mountains. In the neighbourhood is a

Panjikand.

curious construction ; an under-ground canal for watering the fields. The following are some of the chief kishlaks in the district.

<i>Farab</i>	Population	545
<i>Magian</i>	"	577
<i>Fan</i>	"	?

Khodjend is situated on the left bank of the Syr-Daria. It was captured 24th May 1866. In consequence of its favourable position on the

Khodjend.

great trade route between Bokhara and Kashgar *viâ* Kohand, Khodjend has become the most commercial town in the province. There are numerous factories producing silk and cotton woven articles, a good bazaar and a wooden bridge over the Syr. The view of the town across the bridge from the right bank is very picturesque.

In the Khodjend district are the fortifications and town of *Ura-tubé* with 12,000 inhabitants and a large

The Khodjend district.

bazaar in which are sold great quantities of pottery and also horses. Excellent vines grow here without artificial irrigation ; there is a glass factory in the district.

Other towns are, *Jizak* or *Kluchevoy* (a spring) with 3,845 inhabitants, and, 46 versts (30 miles) to the west of it, *Nurek*, a kishlak with a bazaar

Jizak and Nurek.

in which the trade mostly consists in salt which is exported from here to all the bazaars of the southern portion of the country.

THE AMU-DARIA SECTION (PART OF SYR-DARIA PROVINCE.)

The administrative centre of the section and of the Shurakhan

Petro-Alexandrofsk.

subdivision is the town of *Petro-Alexandrofsk* built in 1873 opposite to the

Khivan town of *Khanki* at a distance of six versts from the river Amu-Daria. The population including the troops is 3,250. The town really consists of several cantonments, the houses in which are the property of private individuals. At Petro-Alexandrofsk there are, a steam flour-mill, a tannery and a brewery. There is a ferry over to the left bank of the river and also a terminal station of the Amu-Daria flotilla.

Seven versts to the north of the fortifications is the native town of *Shurakhan* on the large arik of the same name; in the bazaar trade is carried on in cattle, grain, jugara and hides. Hither are sometimes brought in the best horses to be found in the Khivan Khanate.

The fortifications of *Nukus* are on the right bank of the river Amu-Daria nearly 200 versts (133 miles) from Petro-Alexandrofsk.

Nukus.

Nukus is the head-quarters of the Chimbai subdivision; it carries on a certain amount of trade with the nomad Kirghiz.

CHAPTER IX.

SHORT ACCOUNT OF THE KHANATES OF BOKHARA & KHIVA
AND OF THE TRANS-CASPIAN PROVINCE.

The whole of the immense extent of country in Central Asia, bounded on the north by the Amu-Daria and our Imperial frontier along the Hissar range to the Pamirs; on the east by the Pamirs and the upper course of the Amu, on the south by the Hindoo-Koosh mountains and their continuation the Kopet Dag, and on the west by the Caspian Sea and the table land Ust-urt between the Caspian and Aral seas, consists except in the south eastern portion, almost entirely of the sand steppe called the *Kara-kum* which is a continuation of the *Kizil-kum*.

On the south-west our boundaries are coterminous with those of the Persians a peace-loving people who are not therefore dangerous to the tranquility of our subjects, but on the south are the Afghans, a brave and warlike race, behind whom stand the Indians with the English at their head so that in this direction we have to keep our "ears pricked," as the saying is, and our government has fortified posts along the frontier (on the upper reaches of the Murgab) and is endeavouring to colonize this part of the country with Russian settlers in the so-called, "Czar's Murgab estates."

The Kara-kum sands stretching from the banks of the Amu-Daria

The Kara-kum.

river and ever advancing in a southerly direction have occupied a considerable

extent of country; about 1000 versts (666 miles) in length from east

to west, and more than 500 (333 miles) in depth from north to south. Their general characteristics are the same as those of the Kizil-kum, *viz.*, burnt up sandy wastes sometimes salt-impregnated, sometimes clay soil with the scantiest supply of water in the few scattered wells, and the poorest possible vegetation. In summer there are 60 degrees (Reaumur) of heat and consequently frequent sunstrokes; in autumn streaming rains render the clay so muddy as to be absolutely impassable in some parts, and in winter there are 10 to 15 degrees of frost accompanied, however with, very little snow. Both in summer and winter the sands shift from place to place, heaping themselves up into enormous "dunes" (*barkhami*) which again change their form and position under the influence of new winds. The pleasantest time of the year is the spring but it lasts only a very short time.

There are certain parts, however, which enjoy a more temperate climate; such are the Caspian littoral and its islands, (Cheleken and Ogurchin) and the eastern portion of Bokhara, *e. g.*, the mountain valleys of Karategin and Darwaz and those in the Hissar mountains.

The prevailing winds are north, sometimes north-westerly, and westerly and more rarely south-westerly; a rainy day in summer, except in the mountain country of Bokhara, is a rarity. The whole country comprised in the two Khanates and Transcaspia is watered by the rivers Amu-Daria, Tedjend, Murgab and their tributaries, and also by the Atrek on the borders of Persia.

The eastern portion of the country is rich in metals, the western, (Krasnovodsk district) in minerals; the animal and vegetable kingdoms may be said to be in general represented by the same specimens as those of the Turkestan country.

By untiring human labour, lands fit for cultivation are wrested from the ever encroaching sea of sand and thus in the midst of the desert we find fertile stretches of country inhabited by fairly dense populations. Such spots are called "*Oases*."

In the country under discussion we find the following oases: the

Oases.	<i>Akhal-tekke oasis</i> , a narrow strip of land at the foot of the Kopet-dagh or
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Balkan mountains; the <i>Merv oasis</i> , further east, on the course of the Murgab, the <i>Bokharan oasis</i> on the lower course of the Zarafshan and the <i>Khivan oasis</i> on the lower part of the Amu-Daria up to its mouth.	
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These oases having either a clay or loam (loëss) soil, form, when sufficiently well watered, populous centres whose inhabitants cultivate them and engage in cattle rearing, trade and commerce; the chief routes also follow the oases; the desert, in parts, supports nomad peoples with whom cattle rearing is the chief means of support. We will now proceed to examine these oases more in detail.

The *Bokharan oasis* is the *Khanate of Bokhara*. Its western

The Khanate of Bokhara.
(Bokharan Oasis.)

boundary passes through a place called "*Kugertli*" about 180 *verss* (120 miles) lower down the Amu-Daria

than the town of Charjui; the Amu forms the southern boundary. The country thus included may be divided into three portions, widely differing one from another, the *Western, Central, and Eastern* portions.

(a.)—*The western portion* is a plain terminating on the east at the place where the spurs of the mountain ranges of the central portion commence and on the west merging into the sandy wastes of the Kizil-Kum. The central portion of this plain is watered by the Zarafshan river from which numberless ariks irrigate the fields, and from the town of Zia-uddin to that of Kara-kul the country is one densely populated oasis; to the east, this fertility changes into the grass steppe "*Karnak-chul*" which in spring is covered with luxuriant verdure but in summer is burnt up by the scorching heat of the sun. Here there is very little irrigation notwithstanding the fact that there are numerous wells and the river Kashka-daria overflows its banks. The climate in this western portion is very severe, the temperature in summer ranging from 35° to 40° and in winter there are sometimes 10° of frost. This part is unhealthy and many diseases flourish:—Fever, debility, ophthalmia, &c.

The inhabitants of the oasis are engaged in agriculture, cotton planting occupying the first place; after this comes general gardening and vegetable growing, the cultivation of the mulberry tree for silk-worm rearing, and vine growing, being important branches. The steppes, east of Lake Karakul, afford rich pasturage for the so-called, "Kara-kul" sheep, out of the wool of which winter caps are made for the whole Russian army.

Next in importance to sheep rearing in the Bokharan oasis, comes horse-breeding and then donkey-breeding; the horses bred are the "*Argomak*"* and "*Uzbek*†" breeds; the nomads breed camels. The horned cattle are few and of inferior quality.

Trade in the Oasis, occupies a position next in importance to agricul-

Bokharan trade.

ture. It is divided into internal and external. The internal trade is carried on in the bazaars by petty traders with small capital, the external trade is more important being carried on with Russia, Persia, Afghanistan and Khiva. The chief articles exported are raw cotton, raw silk, dressed lamb-skins, hides, rice, dried fruits, carpets and felt.

Manufacturing industries being still in their infancy, even such commodities as sugar and cotton articles have to be imported from Russia; glass and wooden manufactured articles, leather and all articles of luxury are also imported.

Traders are numerous but they only supply the wants of the natives.

(b.)—*Central portion.* This portion, consisting of the underfeatures of the Hissar, Peter I., and Darwaz ranges, called Baba-tag, Gazimalek and Kara-tau respectively with a height of about 4,000 feet, may be said to bear a mountainous character. The slopes rising from the right

* Kostenko says that the "*Argomak*" is the same as the Turkoman horse and Trotter agrees that he probably derives such blood as he possesses from that strain. He is showy and sometimes 16 or 17 hands high, but has not the endurance of the Kirghiz and Uzbek horses. It is not used in harness.—Transl.

† The "*Uzbek*" is somewhat smaller than the Argomak but though it yields greatly to it in point of beauty and slenderness of limb it is vastly superior to it in strength. Generally speaking this breed resembles the ordinary horse in use with the Russian peasant in Europe.—KOSTENKO.

bank of the Amu-daria (here called Panj) are bare at first, but become more fertile as they rise and approach nearer to the main ranges; they are then covered with luxuriant grass and attract large numbers of nomad Uzbeks; the valleys are clothed with groves of pistachio and almond trees; in these parts near the greater heights are found *gold* (in the upper courses of the Aksu, Muk-su and along the tributaries of the Suek-su); *lead* and *iron* (in the Vanj); *coal* among the spurs of the Hissar mountains; *rocksalt* (in the neighbourhood of Guzar, Kolab and Shirabad; at the latter place is a mountain of salt called Khoja-Mumin); *petroleum* (near Shirabad and Baisuu); and hot springs (along the river *Ab-i-garm* and in the middle course of the Dushamba.)

This portion of the Khanate is abundantly watered by the rivers Surkhab, Kafirnihan, Vakhsh and Ak-su with their numerous tributaries flowing from the snowy peaks of the main ranges. These rivers being broad and shallow and flowing in rocky channels are not navigable, but the means of artificial irrigation which they afford renders this part of Bokhara comparatively fertile and capable of producing abundant agricultural supplies.

The banks of the rivers Surkhab, Kafirnihan and Vakhsh about the centre of their course are densely populated, and as all the valleys in the hills are cultivated so that we find here numerous settlements. The Hissar valley is especially distinguished for its dense population. In its lower course the Surkhab flows through an extensive sandy steppe called "*Kizirip-dala*," and in the lower parts of the Ak-su, and by the overflow of the Panja is formed a marsh sheltering numbers of tigers and lynxes. The climate of the central portion of the Bokharan oasis is temperate and healthy. The inhabitants are engaged in agriculture, gardening, vegetable gardening and cattle-rearing. Cotton is here also successfully cultivated and vines stand the winter uncovered.

Grain is exported to Darwaz and salt to Samarkand and Afghanistan; the remaining products are sent to the Bokhara bazaars.

The roads are only fit for baggage animals; trade is carried on in kind.

(c).—The eastern portion of Bokhara—consisting of Karategin and

Eastern portion of the Khanate.
—Karategin and Darwaz.

Darwaz, included in the Bokharan dominions sixteen years ago, from independent Begships,—is traversed by the gigantic mountain ranges of—*Karategin*, on the right bank of the Surkhab river, (starting from the Zarafshan Glacier); *Peter I*,* on the left bank, and parallel to this range across the river Khingou—*Darwaz*. The latter form a mountainous and very wild country; the lowest valleys are over 4000 feet high.

The length of these ranges is from 160 to 180 versts (106 to 120 miles) and their general direction from east to west, the highest summits being in the east; the average height is about 12,000 feet, but separate peaks attain to a much greater elevation as for instance *Trup-chehi* in the Peter I. mountains 22,000 feet, and *Kug* and *Liaur* in the Darwaz as much as

* Peter the Great according our maps.—Transl.

25,000. All three ranges contain numerous glaciers and are covered with masses of snow; difficult passes lead into Zarafshan and Ferghana and the valleys of the tributaries of the Panja (Amu-Daria). The mineral wealth of these mountains is very little explored.

All the ranges are much split up into longitudinal and transverse valleys and gorges; vegetation is met with on the slopes of these but the main chains are entirely bare. In the valleys, which form a summer residence for the Kirghiz, grow:—feather-grass, “chi” and various kinds of wormwood, and, up to the snow line, hawthorne, barley and forests of large plane trees.

The valleys of Karategin are watered by the rivers Muk-su, Vakhsh and Khingou and those of Darwaz by the Panja and its tributaries on the right bank: Karategin, being thus better watered, is more fertile than Darwaz. The inhabitants of the first practise agriculture and sow *wheat, barley, millet, flax, tobacco, lucerne, melons, watermelons, carrots, onions &c.*, and fruits,—*apples, pears, cherries, plums, quinces, and nuts*; their live-stock consists of horned cattle, for tilling the fields, horses, and goats with long but coarse wool. The inhabitants of Darwaz plant mulberry trees and the mulberry is almost their sole means of subsistence. In summer they eat it raw and in winter in a dried state in the form of flour out of which they make a kind of “*chappatti*.” Their dress they obtain by bartering the mulberry for rough matting and sheepskins and even their taxes are paid with the mulberry; in fact the mulberry is the measure “*tubeteika*,”—the currency of Darwaz—and many Darwazis never know the taste of bread all their lives long. There are fairly heavy rains in summer and the heat ranges about 30° (Reaumur); the winter is severe and bracing; in a word the climate of Darwaz is very healthy but the people being absolutely without nourishing food are poor, thin and short lived.

Road communications in Darwaz are only fit for foot passengers and animals without burdens; there is no trade or commerce whatever, the only occupation of the people is drying mulberries for the winter.

In Karategin we see quite another state of affairs altogether; out

Karategin. of their goat wool the inhabitants prepare rude cloth and stockings which serve as articles of export and they also procure the skins of fur animals such as martens and foxes; in return are imported cotton manufactures and iron; the mode of trade is by bartar; the Bokharan unit of money is the “*tenga*” equal to 20 kopeks in Russian or about 3*d.*, in English money; the grain measure is the “*batman*” = 45 *tubeteikas*.

The population of the Khanate of Bokhara consists of a mixture of various races united by a common religion. The total inhabitants are computed at about one million souls of both sexes of these 750,000 are *Uzbeks* with whom are included the *Kirghiz* and *Karakalpaks*; 240,000 are *Tadjiks* and the remaining 10,000 is made up of *Arvites, Persians, Jews and Gipsies*. About one-half of the total population are sedentary the remainder leading a nomad or semi-nomad existence.

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* *Tubeteika* is the name of the cap worn by the natives; it is also a measure.

The Tadjiks are the aboriginal inhabitants of the country but the result of numerous wars has been their complete assimilation with their conquerors the Uzbeks, and conformity to their manners and customs. The present Khan is of Uzbek extraction.

The Uzbeks are in a low state of development, but are disposed to of. Uzbeks and Tadjiks,—character a life of peace; they are lazy, cowardly, deceptive and slovenly. The Tadjiks are distinguished by their fairness of skin and regular and handsome features, they are much more refined and cleanly than the Uzbeks, but are of a cringing and fawning nature.

The central portion of the Bokharan Khanate is the most densely populated, after that the western, and then Karategin; Darwaz contains the fewest inhabitants, the total being calculated at about 30,000 all told.

The total extent of the Khanate is unknown, as, owing to the undeveloped condition of both rulers and people, no scientific calculations are undertaken and neither the Emir nor his Begs, (governors) have any idea of the size of their dominions, the number of kishlaks, people, or live stock, or how much or how little corn is grown and so forth, and the science that would enable them to find out these things (statistics) is looked upon with superstitious dread.

Bokhara is an independent Khanate under an Emir who has the power of life and death over his subjects; he makes the laws and issues his orders despotically although he has a council of ministers for the different departments of state. With the exception of the "*shara*," or Mahomedan law, a written code of legislature does not exist. The Emir is the spiritual as well as the temporal head of the Khanate; under him the chief rank of priest is the *Sheikh-ul-Islam*.

The Bokharan Khanate is divided into districts according to the principal towns which form their centres. The larger districts subdivide again into smaller. Districts are placed under Begs (Governors) appointed at the will of the Khan, the lesser officials being appointed by the Begs themselves. The following are the Begships or districts of the Khanate;—*Kermine*, *Karshi*, *Shaar* (*Shahr-i-Sabz*), *Shirabad*, *Hissar*, *Baldjuan*, *Karategin* and *Darwaz*, *Kerki*, *Charjui* and, as far as the boundary of Khiva, *Kabaklin*.

Army.

The army is calculated at about 8,000 men garrisoning the towns and forts of the Khanate.

The Khan's revenue tax (*ziakat*) is collected by special officials; it is equivalent to one-fortieth of the

Taxes &c.

value of the live stock (sheep, camels &c.) and commercial capital stock in possession; the Begs receive no salary from the Khan but every year in the autumn they collect their own revenues (*Hiraj*) from their district in the shape of one-tenth of the grain harvest.

CHIEF TOWNS OF THE BOKHARAN KHANATE.

Bokhara, the capital, is surrounded by a mud wall about 25 feet high and 10 feet thick; the circumference is about 8 miles; there are 11 gates with

City of Bokhara.

watch towers. The town is watered by an arik, from the Zarafshan river, called "Sharirud" across which in different parts are altogether 12 stone bridges. The chief public buildings are the Emirs' palace or citadel about a mile in circumference (this contains also the dwellings of the chief grandees and courtiers, three mosques and the prison); the palace of the Russian embassy; 360 mosques (to 60 of which are attached also medresses); caravan serais, baths and the bazaar. The bazaar is the first in Central Asia judging by the amount of trade carried on in it and the quantity of money changing hands.

The native buildings are of the same general description as those found in other native towns in Central Asia; the population is about 60,000. In the neighbourhood are many more mosques and also numerous public gardens; about 8 miles from old Bokhara on the Railway is the new and rapidly spreading Russian town with transport offices, stores, shops and substantial houses all quite in the European style.

Charjui, is situated on the left bank of the Amu-Daria where the railway bridge crosses it, and consists of two towns the Russian and Native;

Korki, higher up the river is a strategical point for the Russian troops; it is also the terminus station of the steamers of the Amu-Daria Flotilla.

Karakul is chiefly remarkable for the trade carried on in lambskins (*Karakulki*). In the neighbourhood is a French colony engaged in wine-making and brewing.

Karshi; Tobacco is grown here in large quantities and sent to all the bazaars of Bokhara.

Garm; capital of Karategin, has 300 houses and there is a masonry bridge across the Vakhsh river.

Kala-i-Khum; former capital of Darwaz; at present important as a frontier fort, garrisoned by Bokharan troops.

2.—THE KHIVAN OASIS.

The Khivan Oasis or Khanate of Khiva, formerly called *Kharezmi*, is bounded, on the north by the Aral sea; on the east by the Amu-Daria as far as Pitniak, on the south by the Trans-Caspian province and on the west by the elevated plateau of the Ust-Urt. The fertile portion of the oasis, of an elongated-oval shape, is not great (about 200 miles long by 7 to 50 in breadth). According to its natural features and population it may be divided into two parts: the *south-eastern*, from Pitniak to Khodjeli, and the *north-western*, from Khodjeli to the Aral sea.

a.—The South-eastern portion.

This is a plain, slightly undulating in places, with a sandy-clay soil; the whole of it is intersected by innumerable large and small ariks taking their water from the Amu-Daria. There are nine principal channels in this part of the Khanate varying from 16 to 90 miles long, and from 20 to 60 yards wide and from these numberless smaller ones carry the water to the fields.

The names of the principal canals are ; *Pitniak, Palvan-ata, Kazavat, Shavat, Yarmuish, Klich-Niaz-bai, Karaguz, Arna, Suralla*. The chief secondary canals are *Darialik* and *Lavdan* forming the lake of *Momichakli*.

This is the most populous part of the Khivan oasis as it is most cultivated ; the inhabitants (Tadjiks and Uzbegs) lead a settled life ; the climate is hot and dry and gives rise to fever and ophthalmia.

b.—The north-western portion.

This is mostly lowlying salt-impregnated desert land merging into swamps and lakes overgrown with bushes and dense reed growths, impassable in many places. Notwithstanding the general depression there are nevertheless some elevations in this portion but they are very insignificant ; they are called *Burli-tau, Kushkana-tau, Bel-tau* and *Termambes-tau*. Water is supplied by three arms of the Amu-Daria and also by tributaries and canals which, at the time of full water in the river, overflow and form lakes of stagnant water.

The arms of the Amu are called *Taldik, Ulkun daria* and *Kuvansh daria* with the *Yani-su*. The tributaries are the *Kegeili* and *Purkhan*, and the chief canal, *Khanim-ab*. The chief lakes are *Karakul, Aikul, Kungrad* and *Kara-teren*.

There is little cultivated ground and the inhabitants (Karakalpaks and Kirghiz) lead a nomadic existence ; the climate is hot and, in summer damp, causing fever and the birth of miriads of mosquitos and gadflies which are a veritable scourge to the cattle ; in winter it is very cold (25° of frost during the three winter months) and chest diseases flourish.

Resources of the Khivan Khanate.

In the south-eastern portion agriculture, horticulture and vegetable growing are carried on. In the fields are grown, *wheat, jugara (sorghum, kunjut (sesamum), rice, cotton, barley and lucerne*. In the gardens : *apples, quinces, pomegranates, apricots, the grape and mulberry*. The chief vegetables grown are *melons* of various sorts, *carrots* and *onions*. The principal domestic animals are horses, camels and horned cattle. The numerous expanses of water have given rise to extensive fishing and boat building industries among the people, and charcoal burning and the obtaining of *alkali* from burning the saxaul root are also practised.

After agriculture, trade comes next in importance.

In the north-western portion, notwithstanding the gadflies and mosquitos a great deal of cattle rearing is carried on, also fishing and hunting. Sheep and goats are bred in greater numbers than cattle and horses ; there are hardly any camels at all in this part.

Nearly the whole of the adult population of the islands of the

Hunting and Fishing. Amu-Daria are engaged in the fishing industry in the arms and tributaries of the river, and also, in the winter, in the hunting of the tiger, lynx, jackal, wolf, wild boar, hare and pheasant in the reeds and jungle fringing the shores ; in spring arrive countless flights of migratory birds and flocks of geese, duck, cranes, and pelicans. Agriculture is very

little practised considering the possibilities that exist; barley, millet and kunak (a kind of small pea) are sown in the fields.

From this cursory examination of the natural productions of the

Exports of the Khivan Khanate. Khivan oasis we find that the inhabitants export to Russia and Bokhara,

cotton, silk, fruits, hides, fish, wool and woollen manufactures, carpets and rugs. With the nomads they barter wheat, rice, barley and articles of dress for cattle and wool; with Bokhara they exchange their horses for green tea and tobacco; from Russia they receive manufactured articles, iron ware and sugar.

Internal communications, and those with Bokhara and Kazalinsk

Communications. are mostly by water—the river, canals and the Aral sea; there are caravan

routes to the Turkestan country, European Russia, the Trans Caspian province, and, across the latter, to Afghanistan.

The population of the Khanate of Khiva consists, in the south-eastern portion, of numerous tribes of

Population.

Tadjiks, who are nearly all traders, and *Uzbeks*, agriculturists, who are the ruling race, the Khan himself being an Uzbek; in the north-west are the semi-nomad *Karakalpaks** and the nomad *Kirghiz* and cattle-breeding *Turkomans*. Scattered throughout the towns are *Persian slaves, Tartars, Jews, Arabs* and *Jemshidis* (from Herat),

The total population of the Khanate is calculated at 350,000 of whom 100,000 are nomads.

Khiva is an independent Khanate under an Emir; it is divided into districts under Begs; these Begships

Administration.

are the following:—*Hazar-asp, Khan-ki, Khazwat, Kint, Gurlend, Iialik, Khodjeli* and *Kungrad*. The collection of revenue is carried out on much the same principles as in Bokhara.

Chief towns of the Khanate of Khiva.

Khiva.—The capital and largest town of the Khanate. Surrounded by mud walls 6 versts (4 miles) in circumference with several gates and bridges over canals. The houses are thickly clustered and the streets not paved. The principal public buildings are 2 Khan's palaces, 17 mosques, 22 medresscs, several caravan-serais and baths and about 250 bazar shops. There are about 20,000 inhabitants. In the vicinity of the city there are numerous gardens and old mosques. Between Khiva and Khanki has settled a German colony of menonites.

Hazar-Asp.—Important as having a fort protecting the oasis from the east. It is also the most ancient

Hazar-Asp.

town in the Khanate and is famed for its gardens and orchards, the apples from which are sent to the market of Kazalinsk.

*NOTE.—The inhabitants of the island portions of the Oasis are in addition called "*Arales*" which means "islanders."—Author.

Khanki and Urgench.—Commercial centres. At Khanki there is a ferry to the right bank of the Amu.

Kiat.—Was for a long time the capital of the Khanate.

Tash Khauz.—A fort defending the oasis on the west.

Gurlend.—A fort defending the oasis from the north, and centre of the silk and cotton producing industries

Rhodjeli and Kungrad.—Well known fish markets from which dried fish is exported to the bazars of Bokhara ;

Kungrad is the most ancient city in Khiva.

In the vicinity of *Kunya Urgench* the ground is covered with the ruins of ancient buildings and near here passes the Uzboi or ancient channel by which the Oxus formerly flowed into the Caspian sea.

3. THE TRANS-CASPIAN PROVINCE.

The present oasis at Merv appeared about the middle of the present century, on the lower course of the Murgab river, side by side with that of ancient Merv, or Margiana which was already known in the 12th century B. C. and was more in the centre of the Murgab. The present oasis may therefore be termed the 'new Merv oasis.'

It consists of a level plain consisting partly of yellow loam soil and partly of salt beds ; the former under the influence of artificial irrigation becomes remarkably fertile. The chief occupation of the inhabitants of such portions is consequently, agriculture. The oasis is 70 versts (46 miles) in breadth and the same in length and is surrounded, to a distance of 200 to 400 versts, by deserts and shifting sands on all sides except towards the south where it is connected with Afghanistan by the river along the banks of which, and across the spurs of the Paropamisus range to Meruchak runs a road. Along this road are two inhabited oases, viz. "*Yulatan*" and "*Panjdeh*" (populated by Sariks). The soil of these is much the same as that of the Merv oasis.

The river Murgab takes its rise in the Paropamisus mountains (a continuation of the Hindu Kush) and waters the above mentioned oases. flowing in a north-westerly direction ; it has a length of 465 versts (310 miles) of which 200 versts (133 miles) belong to Afghanistan and the middle and lower course to Russia. Within our borders the breadth of the Murgab is from 34 to 140 yards and the depth, at fullest, 35 feet and in summer when the water is low 7 feet. The volume of water is thus not constant. At the time of the melting of the snows the river overflows its banks forming floods in low-lying lands to a distance of 50 versts (33 miles) while in summer there is so little water that the channel in parts is actually dry ; in the autumn, water again flows in insignificant quantity. The Murgab at time freezes so hard that caravans are able to cross on the ice, but this is not every year.

Near the source the country is mountainous and covered with tamarisk and pistachio-nut trees, in the middle course the banks are fairly steep, groves of larch trees are met with in places and saxaul is especially common ; within the borders of the Merv oasis the banks

are low. There are two tributaries on the left bank—the Kushk and Kashan which form the oasis of Panjdeh. The Murgab is not navigable; in the upper course because there it is only a mountain stream and lower down because its waters are so greatly expended in irrigation. The water is muddy but soon clears; it is pleasant to the taste but causes fever.

In order to avail themselves of the waters of the Murgab for the irrigation of the fields the inhabitants constructed across the channel, at the place where it enters the oasis, a dam called Konshut-khan-bend (75 yards long, 450 feet thick and 63 feet high) which, arresting the flow of the river in its proper channel diverts the whole of the water by two principal canals to the right and left, the canal on the right is called "*Tokhtamish*" and that on the left "*Otamish*" and these in their turn give out hundreds of small ariks and water the fields of the southern portion of the oasis. After irrigating this part the waters again unite in their natural channel and again near the town of Merv are arrested by a "bund" or dam and in this manner they are four times arrested and spread over the fields thus rendering fertile all the suitable soil in the oasis.

Thus almost all the water of the Murgab is expended in ariks watering the Merve oasis and rendering it one of the most fertile in Central Asia.

The oasis of ancient Merv was irrigated in like manner by a dam called the "*Sultan Bend*" but this was broken down by the Uzbeqs in the last century during the war between them and the ancient Mervees. It has now, however, been rebuilt and on the site of the former oasis are being planted the so called "*Czar's Murgab Estates*."

The overflow of the water that remains of the Murgab river, when it is full, forms a considerable lake in the desert called Ainakel (as much as 66 square miles in extent) overgrown with reeds in which are found tigers, lynxes and boars and large numbers of wild duck. In the river fish are plentiful but the natives do not eat them.

The Tedjend oasis is formed by the river "*Tedjend*." It is separated on the south from Afghan territory

The Tedjend Oasis. by the offshoots of the Paropamisus called "*Budghez*" or "*the wind blows*" the name being given on account of the constant winds blowing over this part. The height of the hills is about 2,000 feet. Grass vegetation, "*suz*" and mimosa, are met with in places and where this is absent the hills are of a reddish tint. In the valleys between the hills are salt lakes (between the rivers Tedjend and Murgab) the best known being that of "*Er-oilan*" from which salt of excellent quality is obtained, and there are also fine woods of nut and cypress trees.

Communication with Herat exists by the valley of the Tedjend and Zulfikar pass.

The hills gradually getting lower, finally merge into the general plain and here are formed two oases in the neighbourhood of *Sarakhs* and *Karri-bend* respectively; the remainder of the Tedjend oasis (to the north) is unfruitful.

Two valleys with settled populations, those of the rivers *Dushak* and *Chaurdi* run towards the valley of the Tedjend from the west. The rivers do not reach the Tedjend.

The *Tedjend*, or, as it is called by the Persians the "*Heri-rud*,"

The Tedjend river. rises in the Hindu Kush mountains near Bamian and after watering the Herat valley, passes through the Zulfikar pass and enters our territory. From Zulfikar to Sarakhs it forms our Imperial boundary with Persia and thence, flowing for some distance through hilly and wooded country, it enters the desert and finally loses itself in the sand about 70 versts (46 miles) from the railway. The total length of the river in our country is about 300 versts (200 miles.)

It is only in spring that the river Tedjend contains much water; in summer, below the Karri-bend oasis, it is a mere thread of salt water. The spring floods however form the well known lake of "*Anna-uaz-chunqul*" which remains fresh and does not dry up during the summer.

The Akhal-tekke oasis is covered on the south and south-west by the

The Akhal-tekke oasis. mountain system of the *Kopet-dagh* or "*Khorassan-Turkoman mountains*"

which have a general north-western direction. The main range is in Persian territory and has an average height of 5000 feet, though separate peaks and ridges attain to a greater altitude e. g., "*Turgai*" and "*Ganda-koh*" 6,000 and "*Kara-dagh*" 9,800 feet. The highest part of the chain is in the vicinity of Lutfabad. The mountains terminate in our territory with the low hills of the "*Kwen-dagh*." Along the spurs of the Kopet-dagh is our boundary with Persia which runs south-west to Fort Chat and thence along the Atrek river. These mountains being of inconsiderable height there are numerous passes into Persia the principal being the one by which the road from Askhabad leads to Shirwan. The mountains and their branches are rich in minerals (see "natural productions"); the valleys are clothed with pasture and there are juniper bushes in places, while trees yielding building timber are sometimes met with, as also nut and lemon groves. The animal kingdom is represented by wild goats, foxes, jackals and boars.

There are numerous underground lakes and mineral springs.

To us belong the northern spurs 600 to 2000 feet high, consisting of ruddy-green clay soil partly grass-bearing and partly bare. These hills, gradually decreasing in height towards the north-west, form at the foot a level loam stretch of about 20 versts (13 miles) in breadth by 500 (333 miles) in length after which commence the sands of Khiva, Merv and Bokhara.

This strip of land, cultivated only at the places where streams or springs issue from the hills, forms the Akhal-tekke oasis and along it are scattered towns, auls, gardens and fields; in the midst of it, dividing it into two nearly equal parts, runs the Trans-Caspian Railway.

Towards the Caspian Sea the oasis terminates in a long stretch of shifting sands, and along the shore of Krasnovodsk bay run the slatey-clay hills of "*Kuranin*." South of these, along the course of the Atrek river is the fertile "*Atrek oasis*" inhabited by corn-growing Yomuts

There are only a few settlements, in this part, of the Caspian littoral; these are at "*Krasnovodsk*," "*Uzun-Ada*," "*Mikhailofsk*," "*Chikishliar*" and "*Fort Alexandrofsk*."

The Akhal-tekke oasis is watered by the streams and rivulets flowing from the nearest mountain peaks of the Kopet-dagh; between the towns of Kazandjik and Dushak there are as many as 25 of these which water the inhabited points by means of ariks. Some of them reach the railway and some terminate earlier. At the time when the Persians occupied this land they carried the water much further by means of underground channels (*Karezes*) the remains of which are still to be seen.

The shore of the Caspian is remarkable for the absence of good fresh water, that in the few wells that exist being salt and bitter; only on the frontier is there fresh water in the river Atrek.

The Atrek receives its rise from several streams flowing from the

The river Atrek.

Kopet-dagh within the Persian frontier and receives two tributaries "*Chandir*"

and "*Sumbar*" on the right bank. It flows into the Caspian at the bay of "*Hassan-kuli*," by a marshy estuary.

The eastern shores of the Caspian are elevated in places to a height of 400 feet and consist of slate rocks; vegetation is represented by low bushes and wormwood; about 30 versts (20 miles) from the sea the saxaul growth commences. The sea is important for its fishing industry; the sturgeon and white sturgeon are caught.

Towards the Aral is the extensive plateau of the "*Ust-Urt*" having

Ust-Urt.

a mean elevation of 600 feet; it consists of chalk strata, is waterless, without

vegetation, and almost impassable.

The Krasnovodsk Bay is protected by the cape of the same name

Krasnovodsk Bay.

which stretches 30 versts (20 miles) into the sea in a southerly direction.

Here there is plenty of fresh water, and vegetation which supplies the community with firewood; the inhabitants are occupied in the fishing trade and also export melons and cucumbers.

Owing to the protection from wind and sea afforded by the cape,

The Harbour.

the Bay of Krasnovodsk forms a safe harbour for ships; the bottom is suffi-

ciently hard to give good anchorage and the depth such that sea going vessels can anchor within 250 yards of the shore; the bay does not freeze and navigation is possible all the year round.

Thus as a commercial harbour the Krasnovodsk Bay has many advantages over those of Karabugaz, Mikhailofsk and Hassan-kuli.

In the various inlets there are numerous fish—*carp*, "*cyprianus vimba*" *sterlet* and *rhob*—and migratory birds—*duck*, *grebe*, *swans*, &c.; in the

Karabugaz Bay

Karabugaz bay there is abundance of salt such as is not to be found in any

other part of the world.

On the shore of the Mikhailofsk Bay (on the peninsula of Darj) at

Gulf of Mikhailofsk.

the settlement of Uzun-ada is the terminus of the Trans-Caspian Railway.

Trade vessels come up the bay to this place.

Hassan-kuli is a station for fishing boats. In Krasnovodsk Bay are the islands of "*Cheleken*" (with a convenient inlet) and "*Ogurchin*."

Hassan-kuli.

The island of *Cheleken* supplies petroleum, naphthalin (= "mountain wax") and rock salt; the inhabitants are engaged in fishing and export the

Cheleken.

proceeds to Persia.

This island of *Ogurchin* is 30 versts (20 miles) long by 3 (2 miles)

Ogurchin.

broad and has a good supply of fresh water. The occupation of the inhabitants is fishing and melon-growing. The water-melons (*arbut*) grown here are distinguished for their size and flavour.

The climate of the oases above considered, with the exception of the mountain valleys, the Caspian littoral and islands, is dry and sultry in

Climate.

summer (50° to 60° R. in the sun) and temperate in winter (about 7° R.) Rain falls in February and March and then commences the hot weather which lasts till the end of September and in which rain is a rarity. In summer, in the vicinity of all water, are myriad swarms of wasps, flies, gadflies and horseflies, annoying all things living.

The coldest month is January. Snow falls then, (but soon melts), and the rivers are sometimes covered with ice. Spring and autumn are very short.

The prevailing winds are south and south-westerly; sand storms are frequent and destructive; earthquakes sometimes occur.

Prevailing winds &c.

The climate of the mountain valleys, sea shore and islands is damper and more temperate than that of the rest of the country, both in summer and winter. For instance on the islands the highest summer temperature is 30° R. and lowest 5° to 6° in winter.

The principal diseases are ophthalmia, fever and two epidemics—

Diseases.

"*Karazhasta*" or black plague (the symptoms are severe headache and aching of all the bones, body turning black and ending in death); and "*Mergi*" which is accompanied by severe pain in the stomach and also ends in death. In the Panjdeh oasis is another disease called the "*Panjdeh plague*" which is of the nature of the *Sarts' disease* in Turkestan.

Natural productions.

We will now proceed to the investigation of the natural wealth of this part of the country.

The country is very rich in *minerals*, especially in the west. *Metals*,

Minerals.

although known to exist, are but little worked.

The most important representative of the mineral kingdom is "*petroleum*" or "*naphtha*". This is found along the foot of the Kopet-dagh mountains to the west of the station of Aïdin, in the hills called the "*naphtha*" and in the "*red*" hills. The supply is plentiful, and the oil spurts out spontaneously on the exposure of the impregnated strata of sand. Concentrated petroleum, in the form of "*mountain wax*" is also found here.

Considerable petroleum springs exist also on the island of Cheleken, in the vicinity of Chikishliar, and near Kelat. In the above mentioned localities there are, in addition, numerous hot alkaline iron springs (in Archman and Anau) and at Kelat is a large underground lake called "*Golubinoye*" i.e. "*Blue lake*."

About 200 versts (133) miles) to the north of Geok-tepe, among the sand hills, are found large quantities of natural sulphur. The locality is called "*Kirk-Jul'ba*."

In various parts of the Merv and Akhal-tekke oases natural salt Sulphur. *petre* or *nitre beds* are met with.

North-west of Kizil-Arvat, in the defiles of the mountains, are found *alum*, *iron* and *copper vitriol*. *Turquoises* are found in all the mountains.

On the banks of the *Atrek*, and also between the Tedjend and Murgab rivers, are found beds of *evaporated salt* and north of Merv—*glauber's salt (reussite)*; on banks of the Krasnovodsk Bay in the hills of the peninsula are endless quantities of red and white *gypsum*. The working of all these minerals, with the exception of salt and sulphur, is only carried out to a small extent and with primitive appliances.

Besides the domestic there are various descriptions of wild animals which are hunted by the natives—tigers,

The animal kingdom. . panthers, leopards, jackals, mutton, gazelle, and wild horses. Of the feathered creation—eagles, bustards, ducks, wild fowl and pigeons; insects—the scorpion and phalange, and on the banks of the Murgab are numbers of snakes.

With the appearance of the Russians, the natives gradually began to relinquish their nomadic mode of life and commenced to settle near the Russian towns and forts, changing their plundering and raiding propensities for those of peaceful agriculturists, cattle-breeders and traders. The occupations of the inhabitants are according to the country as follows; from Krasnovodsk to Kizil Arvat cattle-breeding, and to a small extent agriculture; from Kizil-Arvat to Kelat, agriculture increases and cattle-rearing decreases; from Kelat to the aul of Giaours corn growing, gardening and vegetable growing, cotton planting and silk production flourish; from Giaours to the Merv oasis—cattle breeding; in the interior of the oasis agriculture, gardening and cotton growing, and, finally, on the edges of the oasis, once more—cattle-breeding. In the field and gardens we find the same vegetation as in the Zarafshan valley,

The natives are very inferior traders and such as there are, are all collected in the populous centres of

Commerce and trade. the country; the chief industry that flourishes in all the auls is the production of carpets and rugs which are woven principally by the women; the Merv and Tekke carpets are famous not only in Russia but all over Europe.

The internal trade of the oases is inconsiderable and is concentrated in the towns; in the smaller villages there are not even permanent

bazaars or shops, or caravan serais, but on certain days the inhabitants assemble in appointed places to buy and sell. The whole of the commerce is in the hands of Armenians, Georgians, Persians, Russians and Tartars; very few of the natives engage in trade.

The external and transport trades should have a splendid future before them.

Besides the railway there are caravan roads in Trans-Caspia to Bokhara, Khiva, Persia and Afghanistan and, across the Ust-Urt to Orenburg.

Communications. Sea communication, by the Caspian, is kept up with European Russia, the Caucasus and Persia by way of the towns of Astrakhan, Baku, Euzeli and Resht (the two latter belong to Persia).

The population of the Trans-Caspian province consists of;—the *Turkomans*, the original inhabitants of the country settled chiefly in the Merv Oasis (200,000) and Tedjend and Akhal-tekke Oases (250,000); the *Kirghiz* (about 60,000) in the Mangishlak and Krasnovodsk districts; and *Yomuts* (about 50,000) found to the south of the Mikhailofsk Bay and in the valley of the Atrek river. The total number of *Russians* in the province, including the troops, clergy, officials, merchants and traders is about 50,000; also since the completion of the railway, representatives of all European nations are to be found here.

The oases examined above form together what is called the Trans-Caspian province; the head or superintendent of the province is also the Commander-in-chief of the troops.

For administrative purposes the whole province is divided into five Administrative division. districts as follows:—

<i>Askhabad</i> ,.....	chief town.....	Askhabad.
<i>Krasnovodsk</i>	”	Krasnovodsk.
<i>Mangishlak</i>	”	Fort Alexandrofsk.
<i>Tedjend</i>	”	Karri-bend.
<i>Merv</i>	”	Merv.

Askhabad—the capital, is the most populous and busy point in the whole province. It possesses numerous streets and good houses. The town is divided into the Russian quarter and the bazaar; the latter consists of several streets lined with shops in which traders of various nationalities carry on their business.

The remaining towns, raised principally on the site of former fortifications, are not, with the exception of Krasnovodsk, remarkable for their size, consisting mostly of one or two streets. Around the Russian towns the natives pitch their kibitkas (Yurt-auls.)

The principal inhabited points of the province are; Fort Alexandrofsk, Krasnovodsk, Uzun-ada, Fort Mikhailofsk and Chikishliar, all on the eastern shore of the Caspian,—eastward of this, Kizil Arvat, Bami, Geok-tepe, Kakhka, Karri-bend, Koima-ajar and Merv; south of Merv in the corner between the Persian and Afghan frontiers—Tashkepri, Panjdeh and Sarakhs.

ON THE STRATEGICAL AND TACTICAL RÔLE OF CAVALRY.

By A. A. (Captain AUBIER, 12th Chasseurs.)

Translated from the French by Captain J. E. NIXON, Deputy-Assistant-
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This study is the almost word for word reproduction of a lecture delivered to the officers of the garrison at Rouen, in 1891; it was especially addressed to officers of the other arms. The leading idea that inspired it was to clear cavalry from the reproach of "exclusiveness" which is so often alleged against them, and to shew how they seek to make a speciality of their work only in order that they may thereby the better prepare themselves to play their part in concert with all the arms combined. It was necessary also to establish the "*raison d'être*" of the ideas which are at this time current in cavalry. The author in no way claims to put forward purely personal ideas; this work has been principally inspired by the ideas contained in the following studies:—

1. *Projet d'instruction de 1879, sur le service de la cavalerie en liaison avec les autres armes.* (General de Gallifet.)
2. *Instruction tactique relative aux manœuvres de 1888.* (General de Gallifet.)
3. *Cavalerie en campagne.* (par le Commandant Cherfils.)
4. *La Cavalerie dans la guerre moderne.* (par A. A.)

The study of the tactical rôle of cavalry constitutes to-day a proof of the way in which we are sometimes obliged to draw the line between plain speaking and respect for the regulations.

The latter have happily been so well edited that, though the letter may be infringed, the spirit may almost always be respected. We are in the midst of an epoch of transition and of progress; we look for its benefits, but we experience its inconveniences.

Although all our leaders and all military authors, in point of fact, admit the participation of cavalry in the different phases of war, few among them agree on most of the points concerning its organisation, the manner of its division, and its employment. But from all these questions, which are mutually connected and are dependent on each other, the tactics of the arm naturally result. Improvements in arms, which are being continually grafted on this uncertainty, have increased it; so much so, that it may almost be said that cavalry has not yet reached the final limit of the evolution, whence must spring, in a rational and definitive direction, the element essential to the vitality and the power of all the arms—*unity of doctrine.*

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However, in this divergence of opinions there is one fixed point, which may doubtless serve as a restraint, but which still constitutes a fresh difficulty, and that is the inherent immutability of our tactics. The horseman and his living arm, the horse, are simple elements, which are opposed to scientific innovations; the great principles, which have at all epochs regulated their employment, do not admit of any change, and seem to condemn cavalry to a relative immobility in the midst of a universal movement; the methods of application only have varied according to the suppleness of the instrument or the skill of the leaders. I will try and shew that these principles, which are essentially stationary, can nevertheless be in harmony with the present progress.

First of all we must see how the particular tactics of cavalry agree with tactics in general; and how they can aid in carrying out a common duty.

Cavalry (I speak of cavalry which is up to its work and well employed) ought to intervene in all phases of a campaign. In some it will have a preponderating and primary rôle, and in others a subordinate but necessary mission.

Sketched in broad lines, the following is its general rôle:—

During mobilisation and concentration, it covers the strategical front of the armies, it threatens those of the enemy, and, after having beaten or given the slip to his squadrons, it penetrates, if possible, to his fighting bodies in rear; at any rate it finds their main positions or the general direction of their march. On the issue of this enterprise depend, for the commander-in-chief, darkness or light, and for the troops, disquiet or confidence; in a word, inaction or the initiative. Cavalry is the first to disturb the material and moral equilibrium. Victorious or vanquished, it furnishes a clue to the future of the campaign, for on its fortune it depends whether the army forces, or submits to, the first battle.

During the forward march, it covers and screens the movements of the armies; it surrounds the columns with a watchful screen, tears asunder the veil of the opposing cavalry, discovers the projects of the adversary, and assures to its own side an atmosphere of security, confidence, and liberty of movement.

During the battle, it participates often in the prelude, sometimes in the principal act, and always in the *dénouement*. It protects its own artillery coming into action, paralyses that of the enemy, covers the tactical deployment of the army corps, and disquiets that of the hostile columns. At the decisive moment, it can throw into the balance the considerable weight of its moral effect, and precipitates the crisis by its sudden appearance.

In pursuit or in retreat, on the battlefield, it reigns supreme; in a few seconds, it can reap the fruits of long efforts, or at least, if the solemn hour of sacrifice has arrived, it can oppose a desperate resistance to the formidable blows of the victorious troops.

That is the theoretical picture, and examples are not wanting in history which permit of the verification of its truth. In 1805, the cavalry completely masks the strategical movements of the Grand

Army; at Marengo, at Custozza, it sows the germs of victory; it repairs a tactical fault at Vionville; it decides the crisis at Aspern and at Borodino; it turns a defeat into an irreparable disaster at Jena and Waterloo; it prevents a retreat being turned into a rout at Königgrätz; it lights the battlefield with a blaze of heroism at Morsbrunn and Sedan. In fact its particular tactics embrace and sum up the synthesis of war; an attempt to study it apart from tactics in general would be an operation as futile as building a room without taking account of the house.

I will, however, treat the subject in broad lines, and I will, above all, endeavour to keep myself free from the instinctive tendency which leads us to enlarge our subject at the expense of its surroundings. Infantry is and always will be the Queen of Battles; for it is the chief part, the body, and therein possess an inalienable quality. But in an army as a whole all parts ought to aim at a marvellous unity. A force which is carried away by an impulse of separation may compromise the working of the whole system; while perfection in the working of the various wheels will, on the contrary, produce the maximum of power. This evidently is the object of our desires.

Having sketched the rôle generally, it remains to examine it by the light of the regulations. In the general development of the campaign, cavalry fulfils successive missions, the character of which varies according to the phases with which they deal. These phases may be thus broadly classified:—the mobilisation, the concentration, the forward march, the strategical movements of the armies, the tactical deployment, the battle, and lastly, according to the fortune of war, the pursuit or the retreat. This same progression is reproduced in the further course of the campaign, but with such a moral difference that the rôle of cavalry is sensibly modified by it.

This synthesis of war then introduces, for cavalry, two distinct periods. Firstly, the period of mobilisation and of concentration, during which it works in isolated masses, which are called "independent." Secondly, the period of movement, followed by the collision of the armies, during which it works "in connection" with the other arms.

In each of these periods cavalry has a double mission to fulfil: a reconnoitring and safe-guarding mission, this is its "strategical" rôle; and a fighting mission, first, against cavalry, and next, against the other arms, this is its "tactical" rôle. The first is comprised in the regulations on "Duties in the field;" the second in the regulations for drill and manœuvre.

I.—Independent Cavalry.

The exact meaning of the expression, "independent cavalry," must first be understood. It signifies that, during the period of strategical reconnaissance which precedes the setting in movement of the masses, cavalry launched on a voyage of discovery is concerned less with its own arms than with their objective. It has received a formal mission to gain contact; to accomplish this, it gains a free hand. Correctly then, it has only independence in the choice of its methods. This explana-

tion is required to assign to a rather vague term the qualified and relative attribute which it possesses.

The rôle of independent cavalry, operating in advance of the armies, is thus summed up in "Duties in the field":—

"To explore the country, to gain touch, and to keep it; to fight and drive back the enemy's cavalry, and get close to his masses; to find out his positions and his movements, and to furnish the commander-in-chief with the general information which he needs to enable him to direct his troops and to make certain of the success of the operations."

The regulations admit, that from analogous but distinct missions will spring, for the cavalry, on both sides, "a series of successive shocks, gradually increasing in intensity from the skirmishes between patrols up to the collisions of the masses."

The contingency of this struggle, which is here generally indicated, has passed into an axiom; and only after its accomplishment, will the victorious cavalry be able to vigorously profit by its material and moral superiority to penetrate to the very masses of the enemy.

I have quoted the words of the regulations in order to establish the fact, that in foretelling the almost inevitable occurrence of this "duel of the sword," I have not yielded to any personal notions or to any ideal of the cavalry soldier. Our adversaries, moreover, have decided on hurling all their cavalry on in advance of the armies, according to the accepted maxim, "Cavalry to the front." All their generals, all their military authors, von Schmidt, Frederic Charles, von der Goltz, the Prince of Hohenlohe, von Moltke, and lastly, the Supreme Chief of their army, the Emperor William the Second, advocate its application. This expressed tendency imposes on us, under pain of incurring an inferiority at the commencement, the obligation of not deserting our post, of not abandoning to our adversaries the privilege of reconnoitring, and, as a consequence, the initiative. Whatever be the ground, these masses of cavalry, collected on the flanks of armies in contact with each other, in zones which are relatively restricted and in directions which are more or less imposed on them, are called on then to rush on one another. If space is wanting for the attack in long lines, in a series of deployed fronts, they will engage in depth, by a succession of echelons dashing one after another on the common objective. Then, being clear of the grasp of the enemy, and free from the restraint of guarding against him, and having acquired full liberty of movement, the victorious cavalry will at last be launched to accomplish the second part of its task: the discovery of the hostile masses. In short, two phases of exploration are distinctly visible, separated by a phase of fighting. Two objectives are projected on our horizon, the first, the hostile cavalry; the second, the point of concentration of his armies; and on the road, between the two, the inevitable battle.

What will be the first method of performing the duties of reconnaissance? To ascertain that, we must conjure up as far as possible, the real conditions of a campaign. I have neither the time nor sufficient knowledge to address myself to a strategical hypothesis, allowing of a general sketch of the initial operations. But we may make use of ideas

put forward by military writers of acknowledged authority, as a canvass on which the broad lines of our duties are inscribed. "What must we do to be victorious?" said Napoleon. "Be stronger at a given point." This given point being the main hostile army.

This simple and vigorous conception of war raises the presumption that, in this vast accumulation of the living forces of two countries, and in view of a campaign where the fate of the nations will irrevocably be decided, neither side would wish to compromise the result of the first encounter by a premature engagement. The two armies will only move forward when their forces have been collected. Their fronts of concentration will then be separated by a comparatively large zone. In examining the map of the frontiers, it is almost possible to determine, by inspection of the network of railways, the transverse lines, the depots, the disentraining platforms, &c., the immoveable marks, inscribed, so to speak, on the soil, which will be used for the strategical deployment of the armies.

But the covering troops, ahead of them and keeping firm hold of the defensive positions, will almost be in the presence of each other; between these two advanced fronts, there will not be room for a grand battle with the sword. It follows then from this, as from a study of the map, that the drama, with which we are concerned, will probably be unfolded on the flanks. How will these masses of cavalry, bound to an immediate offensive, advance on their voyage of discovery?

The working of the system of reconnaissance is broadly treated in paragraphs 117 to 120 of "Duties of armies in the field," the details being developed in the special instructions of cavalry. The *formula* and the model are known. A cavalry division detaches two reconnoitring squadrons, which are sub-divided into reconnoitring patrols and their reserves; the whole system covers a front of 30 to 40 kilometres, and is preceded, at a distance, by officers' patrols. The patrols scour the country to the front and flanks; officers' parties, like so many probes, are launched on suspected points. In rear, the division, like a gigantic cruiser, marches concentrated, covered by its torpedo boats, by which I mean its elements of security.

To this sort of picture a theoretical value only can be given.

The example given in the regulations is doubly abstract, owing both to the unit taken as a type and to the general working of that unit. The concrete eventuality of a war with Germany brings before us, on both sides, the concentration of several armies, each composed of several army corps, the whole under command of two commanders-in-chief. Reconnoitring duties will then be carried out for the benefit of the commander-in-chief by groups of divisions placed under the command of one man. Thus it was that Murat acted under the superior orders of Napoleon. The division then is only taken as a model; it is the mass of cavalry on a reduced scale. Similarly the regulation dispositions apply to ideal ground, to ground like a billiard table; it is only meant to show that, even on a very extended front, two squadrons are sufficient for reconnoitring, which permits the divisional commander to keep 22 squadrons in hand as a fighting mass. Any other disposition can be

adopted, provided that only the detachments which are logically necessary are made.

Thus one of the permanent principles of our tactics, concentration, is well brought into view. From this concentration will spring strength, and, consequently, the spirit of the offensive, the initiative of the attack. To sum up, some light and clear-sighted elements in order to see, and a mass, coherent and powerful, for the fight, that is all that need be extracted and retained out of the regulations. The rest is useless, and, sometimes, hurtful. I say "hurtful," because if we apply to a Franco-German war the principle of dispersion in breadth and in depth, we run the risks of grievous miscalculations. The regulations have been made on the experience of the past; the application of them ought to be based on a forecast of the future. In every case—and in all occasions of war—concentration of force is an immutable principle which can never be violated with impunity.

What will be the rôle and the composition and procedure of the elements which are detached to see? Both ought to aim at a common object: gaining touch, but by different ways. The exact value of the word, "the contact," must be understood. It is a general term, the signification of which varies with the objective. Apparently, contact occurs when the *antennæ* of the reconnaissance feel each other and grapple; in reality, contact only exists when the main objective is discovered. Thus the exploring cavalry will only have gained real contact when it has gained knowledge of the positions of the fighting bodies. But previously, if masses of cavalry bar the road, they must be reconnoitred and attacked. There exist then for cavalry two successive contacts, that with the cavalry, and that with the army.

This quality of contact is the most delicate and the most disputed point in our strategical mission. A decision in fact is required whether we should, at the outset and deliberately, advance to the discovery and attack of the hostile cavalry, or if it would not be better to avoid them and resolutely make for the main objective, the field armies. It seems to me that it is only a question of opportunity. If the reconnaissances, started from the first, report the presence of a mass of cavalry in the zone of action, we must make for them, so as not to be anticipated in the offensive. If the ground is open we must go ahead. But the probable conditions of the Franco-German war hardly admit of the second hypothesis. In all cases the processes of discovery are analogous.

The officers' reconnaissances probe rapidly and deeply, whence springs the first news of the enemy. The reconnoitring patrols, only launched when the enemy is approached, will take up this superficial, but continuous and progressive, contact, and will allow us to enclose the adversary in a network, which will give us warning and close him in closer and closer.

To accomplish this mission, I repeat, in the special hypothesis of a war with Germany, it would be dangerous to follow servilely the regulation model. In fact a regulation is conceived for a *tabula rasa*, for an indefinite theatre of operations, and not in view of a precise eventuality. In war, we have regard, not only to the ground, but also to the dispositions, the strength, and the morale of the adversary.

Napoleon acted thus, when, before Jena, being doubtful of the ancient fame of the Prussian cavalry, he arranged that *all his parties, all his detachments of cavalry, should be superior to the parties and detachments of the enemy*. Later, when his troops had themselves gained "morale," he freed himself from this prudential measure. He returned to it in 1813, when disaster had swallowed up the magnificent squadrons of the Grand Army. Here we find the real leader, the practical man of war, who knows how to take into account the human element. Progression from the small to the great is necessary.

If it were only a question of tracing out an invariable model and of applying it to all circumstances and all kinds of ground, there would really be no need to place so many officers at the head of the troops, or, at all events, their rôle would be reduced to that of mere copyists and mechanical transmission agents. Our duty is more elevated and more extended; we must meditate on the practical lessons of history, and derive advantage from them. Now a fallacy, the issue of the "experience of great manœuvres," has spread abroad this idea, that very effective results can be obtained by means of small groups composed of a non-commissioned officer and two or three men. In fact we have seen such groups display an unparalleled audacity, and traverse or turn all the hostile lines, and even sleep in the enemy's camp. But we forget too much that, besides every consideration of material danger, the morale of these men is not at stake. Now "the morale is everything in war," and I do not believe that reconnaissance would be carried out in the same manner in the midst of a hostile population and of hostile troops. Moreover the regulations formally order that "the division commander should determine the force of the troop or the number of men who should accompany the officer." According as the country is friendly or hostile, according as the ground is free from the enemy's cavalry or covered by his squadrons, the reconnaissance will then be composed of several men or of one troop.

But in this special service, more than in any other, conventionalism ought to be avoided; circumstances will decide dispositions which are essentially variable; in some cases, 100 picked men may have to be sent; in others, one officer, or two officers by themselves.

In all that concerns patrols, we cannot be too strongly convinced that, to see, to gain contact, they will have first to push back the opposing patrols, to have a certain force of penetration, and consequently, that they must be of a strength equal, if not superior, to those of the enemy. "The Germans," said General de Kerhué, "the Germans say, that to see and observe, small patrols will not last long, that they will vanish at the first resistance, that they will be able, at the most, to say where the enemy is not; so force will soon have to be substituted for cunning, that is to say, that the fight will soon occur."

Let us make no mistake about it. With the ideas of the offensive which the German cavalry profess, with the force of traditions with which it is animated, the duties of reconnaissance, I mean the reconnaissance *at the commencement*, will be carried out at the point of the sword; and the best manner of meeting this process of intimidation is

to make our discovery parties very strong, and to instil into them, as orders, that they are to charge headlong all groups inferior in number who try to oppose their march. This rule is as simple as it is useful, and it alone will give back to French cavalry the place which it has lost. In order to ensure the execution of it, it will be necessary to give our groups of discovery the double superiority of quality and quantity; that is to say, *a large strength*, and for leaders, *officers*.

Let no one object to the necessity of minutely examining a country; those are narrow ideas drawn, we may say, from reading "the trappers of the Arkansas." The strategic reconnaissance ought not to affect the form of a beat after hares, but that of a vigorous and uninterrupted offensive; it is a sort of *general offensive*.

Finally, the condensed troop, that is to say, the troop stripped of its indifferent men and horses, and provided with all the modern machinery for the transmission of intelligence, seems the best type of a scouting party. It is not, however, necessary to multiply the number of these groups, for a mass of troops—an important tactical unit—cannot live and sleep in the open; cannot wander about haphazard in the country, without direction or object, but it leaves one position to take up another; in a given zone, it is a question of determining these positions and these directions, of probing the latter and seizing the former, and neglecting the remainder.

To sum up, *the duties of reconnaissance require picked groups, all commanded by officers*. This tends to prove, in conformity with Napoleon's axiom, that "all ranks of cavalry ought to be more numerous and better instructed than those of the other arms."

It is hardly possible, in the broad outline of a general study of the strategical and tactical rôle of cavalry, to insist on the details of the duties demanded by these rôles. The section on "Officers' reconnoissances" would alone require a special and deep study. But here is one point quite peculiar to our arm, and it will be sufficient for me to call attention to its importance and interest, for it is the main point in the permanent and effective performance of the duties of reconnaissance. It would be desirable that the education of officers should be more practically directed in regard to this duty.

We have left our division on the march, strongly concentrated, and preceded and surrounded, at a close distance, by security parties. The strength of the advanced guard will vary according as the general assigns to it a rôle of resistance or protection, of demonstration or of some sort of intervention in the fight (*a tactical rôle*, in short), or if he assigns to it simply a mission of watching, *a warning rôle*. This last solution is nowadays considered preferable. In fact a cavalry advanced guard is not generally called on, like those of the other arms, to deliver a sort of "advanced battle," behind which the real battle may be prepared. It can only be called on to play an extremely short prelude by way of diversion, of rapid demonstration; and the instantaneous nature of the cavalry fight does not usually allow it to take up its place in the fighting mass.

Nevertheless the regulations ordain that, in the forward march, "a brigade, and preferably the light brigade, should form the advanced

guard." Keeping this order has occasioned, at the great manœuvres, serious inconveniences ; it has been recognised that it was advantageous to depart from it when the march had, for its objective, hostile cavalry. For the fight, the division ought to keep two "shock" brigades ; besides, it ought to make certain of a reserve, which, at cavalry manœuvres, is formed from the advanced guard, the light brigade, this being rallied at the last moment to form the reserve. But we cannot count with certainty on the opportune intervention of a reserve thus improvised ; besides, even in the case where the advanced guard had a tactical mission to fulfil (such as drawing the enemy on in a false direction, or throwing itself on to his flank at the moment of his deployment), it appeared sufficient to form it of one regiment, the second forming the nucleus of the reserve.

When the division does not march against its peculiar rival, the enemy's cavalry, and when there is no fear of an attack, it is not inconvenient (and it may be often advantageous) to form the advanced guard of a whole brigade ; it can then, owing to its numerical strength, occupy a defile, and clear the road for the main body, and in all cases, rejoin it promptly. The slight difference, in regard to the constitution of the advanced guard, which I have noticed between the theoretical instructions of the regulations and their practical application, will several times crop up in the examination of the fight of the division. If I allow myself to contrast the spirit and the letter of the regulations, it is certainly not in any spirit of vain criticism, but to throw a strong light on new tendencies which have been officially expressed and explained. Moreover, in this matter I conform to the very intentions of the authors of the regulations. The regulations of 1876, slightly modified in 1882, date from a time when the probability of great cavalry fights began to be accepted as a certainty, but did not appear so clearly as to permit of definitive form for this fight being fixed. The general principles for the leading and employment of corps of cavalry were well formulated, but they had not then passed into practice. The first great manœuvres brought about a revision of the regulations in 1882, that is to say, a codification of the evolutions and manœuvres of the division. But this was an early, and to some extent, a premature attempt. It did not attain to the substantial and genial simplicity which marks the limit of all this laborious evolution. So the authors, foreseeing that experience had not said the last word, did not wish to give it a definite and absolute character. To forestall all inclination to stand still, or to routine, they even took care to formulate their profession of faith. They write in their report to the Minister, "The work which the Committee has the honour to submit for your approbation, satisfies, as completely as possible, the demands which the different annual manœuvres bring out. There is every reason to suppose that numerous imperfections will be found in it, when it is practically applied ; the Committee do not hesitate to say that its work is and will remain capable of improvement." In the same year, by a Ministerial Circular of the 10th November, important modifications were made in the preparatory formation for the fight. Since then it has been

continually tested ; fresh tendencies appear and are formulated in the notes added to the text of the regulations, or in semi-official pamphlets, or in lectures delivered in the war schools. They are characterised by a rational progression towards simplicity of ways and means. They must be taken into account, for what is progress to-day, may be the regulations to-morrow.

Our division then, which quitted its cantonments by several roads, is concentrated after penetrating into the dangerous zone, and now, on the information afforded by its first reconnaissance, it marches across country towards the enemy ; it intends to meet him and desires to attack him. The general has formed his brigades either in column of masses or in line of masses, according to the nature of the ground. He himself is close up with the advanced guard, in order to get the first news and to catch the first sight of the enemy. When the approach of the enemy is signalled, he rallies his advanced guard, causes the ground to be watched by patrols, and forms his division in *preparatory formation*.

I only use this expression because it is regulation ; it requires an explanation. In reality a cavalry fight cannot end in a *formula* or a *formation*. It is admitted, however, that an image may be conjured up, in order to afford a sort of definite idea, and a tangible representation of this fight. Place a mass of cavalry on a flat plain, bare, without woods or rivers, without valleys or ridges, with an imaginary enemy, in a vague direction, somewhere ahead ; and tell this mass to get ready for the fight : it will assume a *formation*. Place this same mass of cavalry on real ground, before a living enemy, give it certain fixed conditions, and it will assume dispositions which vary according to the enemy and the ground, *tactical dispositions*. Now, in war there are no general situations, the situations are all particular and positive. However it be, we must not confound the normal disposition with the definite fighting formation ; its name indicates that it is preparatory and transitory.

This implies then, that nothing either in the appearance of the ground or the dispositions of the enemy, has suggested to the commander of the division a tactical idea appropriate to the circumstances. Simply set in the probable direction of the attack, he echelons his brigades in such a way as to prepare their deployment and facilitate the fighting formation being rapidly assumed. But it is clear that, in most cases, special circumstances will substitute, for this conventional echelonning, logical and appropriate dispositions.

The preparatory disposition indicated by way of example in the regulations, rests on a basis of three lines of equal strength, disposed in echelons with the centre in advance. (Figs 1 and 2.)

The expression "line" does not signify a mathematically exact line ; it does not imply any idea of deployment ; it means an echelon, a sub-unit of a division, in some formation. The first line, called the attacking line, is generally formed by cuirassiers ; the second, called the line of manœuvre, by dragoons ; the third, the reserve, by the light brigade. The denominations of the lines indicate their rôles ; their

distances are calculated to admit of their co-operating for the same end, without their being prematurely drawn into the action of a preceding line; in short, they are obliged to lend each other a mutual support, while they ought to preserve their liberty of movement. Their action proceeds in rapid succession, but not simultaneously. These diverse considerations have conduced to fix the distances as follows:—200 to 300 metres between the first and second lines, 300 to 400 metres between the first and third, the artillery marching 150 metres in rear of the centre. Experience has proved that it is advantageous to reduce these distances. In the same way the following were the formations first adopted:—first line, in line of masses at deploying interval or in line of masses; second line, in line of masses with or without deploying interval; third line, in line of masses without deploying interval or in column of masses. Since then a condensation of this disposition has been seen to be preferable; the first line, in line of masses at close interval, the second and third lines, in column of masses. Thus this rational tendency to concentration, which ought to be the basis of every tactical conception, has been affirmed. We have gone still further on this road, and I believe that the future will see the absolute suppression of the preparatory formation, and the passage, without any transition or any halt, from the closing up formation to the definite fighting formation, that is to say, to the deployment.

It is found, in fact, that even in its most concentrated order, the preparatory disposition too much presupposes the course of the fight; and irremediably engages the attack in the original form and direction; that the position of the second line on one flank, when the ground does not require it, or it is not quite certain which flank is threatened, exposes the brigade to charging the air, and this is what frequently happens at the great manœuvres.

In this connection, we here present the picture of how, in the future, cavalry combats will generally be carried on: the three brigades march one behind the other (in line or column of masses, according to the ground), at 200 metres distance, the artillery 50 metres behind the first (or on a flank, if the ground requires it). In the most favourable cases, they can even be disposed in a triangular formation, the first in line of masses, the two others in column of masses, forming echelons at equal distances on each flank, one of these brigades, in accordance with the plan of the attack, forming the reserve; in every case they ought to be engaged only by echelons of regiments.

In the present organisation of our cavalry divisions this disposition seems the best, but it is impossible not to see its faults. The light brigade, which furnishes the advanced guard during the closing up march, (*"marche d'approche"*), should constitute the reserve during the fight; thus a sort of introversion of the lines occurs at the critical moment, or at least a dislocation of one of them. It may even happen (and the regulations explicitly recognise the case),* that the advanced guard has not

* Para. 76 of the regulations runs thus (assuming the preparatory disposition):—"If the advanced guard brigade has not rejoined the main body by the time the preparatory formation is assumed, the divisional general takes some squadrons temporarily from the second line to form the reserve."

been able to rejoin the division for the fight. Properly speaking, the division does not possess an intact, certain, and compact reserve. On the other hand, the formation of one brigade of the second line, on one flank only, protects more than is necessary of one of the two flanks, but does not sufficiently protect both flanks of the system. The ideal formation would be that which, when the advanced guard and the whole of the exterior detachments had been furnished from supplementary squadrons, and both flanks of the attacking line were equally protected, retained, over and above them, an entire and compact brigade to sustain and nourish the fight; in short it would be a square formation. (Fig. 3).

But to do that, it would be necessary to add to the division, the autonomous and complete instrument of the fight, a group of scouts by way of pilots, or even to form each light cavalry regiment of six squadrons, to allow of their detaching one or two squadrons without impairing their tactical value. This was how Napoleon acted.

Following out this idea, the second line (the manœuvring line), divided into two flank guards, would always be formed by the light brigade. This was Frederick's method.

The third line would march at such a distance as not to be carried away by the action of the first; it can keep sufficient distance without inconvenience, because it is the "reserve", and is not required to intervene in the first shock.

Of course, by the expressions "in rows, in triangle, in square," I refer to formations during the closing up march, and in no way to the fighting dispositions, for the latter are nothing else but the material expression of the tactical idea. They are the outcome of the dispositions for the attack. Now these dispositions can only be taken up when the adversary is in sight, and both his strength and his intentions can be properly appreciated.

Directly the reconnaissances report the main body of the enemy, the divisional general gallops on to look at them; having gained his position, he halts and looks. *He ought to gallop and detach himself* from his troops, not only to see, but still more to prevent his division being seen. If not, he is no longer free to manœuvre, he has no longer the initiative in the attack; but he must attack. Two forces of cavalry which meet each other can with difficulty escape the obligation of fighting; that side which makes the half turn will be morally and materially lost, unless it rests on some solid "*point d'appui*;" then it would be a feint and the application of a tactical idea. The general, according to the ground and according to the enemy, pivots his attack on one or the other wing, or the centre, and communicates his orders briefly to his brigades. For example. To General A., Commander of the first line: "Attack in such a direction." To General B., Commander of one of the flank brigades: "Support the attack on such a flank; engage the whole of your brigade or only engage it by echelons of regiments." To General C.: "Remain in reserve in such a formation." To the Officer Commanding the artillery: "Take up a position in such a direction." And that is all.

The brigadiers gallop off to take up their places ; the divisional commander raises his sword ; the division deploys, dashes forward, and springs at the throat of the enemy.

The deployment ought to be instantaneous and done in one movement. We have given up intermediate movements, all those accordeon-like movements, by means of which we passed from lines of masses at close interval to lines of masses at open interval, from this to line of squadron columns, and from lines of squadron columns to line. We pass directly from mass to line by successive echelons of all the units. The movement is more prompt, more certain, more rapid, and it has the advantage of keeping the troops under the eye and voice of the leader up to the last moment. Moreover the line of squadron columns is a transitory and dangerous formation, condemned to disappear ; between it and the mass at elastic intervals, the only practicable formation in diversified ground, there is only a distinction in words.

Each unit deploys on itself, forming echelons, and, only when formed, does it advance into line or to the attack. This rule applies not only to the brigades, but even to the regiments of the brigade, and to the squadrons of the regiment. In these deployments, rapidity must be sacrificed to order and cohesion. In the fight of cavalry against cavalry, it is not the pace, but cohesion, which produces the greatest moral effect ; on the other hand, in the fight of cavalry against the other arms, rapidity is more important than cohesion.

Lassalle's remark must always be remembered ; he used to say on seeing hostile squadrons dashing forward at headlong pace : "These are lost men." He himself attacked at the trot, and only took up the gallop at the moment of charging. He, on the contrary, attacked infantry at full gallop. Nowadays the pace of the gallop has replaced the trot ; it is so much the custom, that well trained cavalry ought to be able to perform evolutions at the gallop without the least disorder, but at the gallop of manœuvre, and not at the increased gallop.

As regards the reserve brigade, it may be most accurately described as a reservoir, whence the general draws, according to his needs, a squadron, a wing, a regiment, which he may hurl successively into the mêlée. The rule is to keep some sort of a group to serve as a nucleus to rally on.

Horse artillery attached to a division borrows from cavalry the directing principles of its tactics : *concentration in its employment, independence in its methods, rapidity in execution.*

The commander of artillery, having been informed of the tactical idea of the commander of the division, has no more orders to wait for. He ought to sacrifice precision of fire to rapidity in coming into action, and aim more at moral than material effect. He ought to force the hostile cavalry to manœuvre and to deploy. His audacity ought not be diminished by the fear of being surprised. The cavalry fight is of such short duration that, in case of surprise, he will be quickly disengaged, if his side is victorious ; but if, on the contrary, it is beaten, he can with difficulty escape the grasp of the adversary ; this consideration settles the question of escort ; not being required to protect it by the

sword, it ought merely to be strong enough to protect it by vision, that is, to scout the zone of the position taken up by the battery. *It ought not to be a fighting body but a group of scouts.*

That is the picture of the cavalry fight divested of all didactic subtleties. If I have succeeded in tracing out its character, it will be understood that it constitutes one of the most delicate and formidable problems in tactics. In this rapid and almost instantaneous succession of all the phases of the struggle, the approach, the manœuvre, the deployment, the shock, it is easily conceived that the regulations have little influence and that the personality of the leader is the preponderating factor. To rapidity of conception he ought to unite personal rapidity of execution. Add to this that every fault is irreparable, because in a cavalry action there is not only defeat but disaster; it is not a case of retreat, it is flight (with the sword at one's back), the ruin and complete demoralisation of the vanquished, and no one can exactly say which is the more prejudicial, the material or the moral injury. A good cavalry leader ought to be infallible. It is very certain that the best cavalry, if not well commanded, is not worth in war the money it has cost, while the most mediocre cavalry, under morally and physically vigorous leaders, may accomplish prodigies.

Before quitting the cavalry fight, it is advisable to say a few words regarding the fighting formation of the German cavalry. The equilibrium of this formation rests entirely on the reinforcement of the first line, which is formed of two brigades, of which three regiments are deployed on the same front, and the fourth is placed directly in rear as support; the second and third lines, which are kept very close, are formed each of one regiment. The whole stake is placed on the first line, and, with this sort of bludgeon stroke, the Germans imagine they will overthrow our system of echelons. It required a cavalry, intoxicated with its recent traditions and animated by the purest spirit of the offensive, to advocate this audacious system of tactics. But this audacity does not suffice to hide its inconveniences. The deployment of three regiments, each of five squadrons, on one line, is long and difficult; many places will not admit of it; and lastly, a slight change of direction will be sufficient to cause the whole or a part of the division to charge the air. On the other hand, it does not appear that the strength of a mass of cavalry is increased by placing a larger number of its constituent elements on one line. In fact, if they occupy the same breadth of front, it matters little if they are not all at the same level. A cavalry division is not outflanked because its first line is less long than the opposing first line; it is enough that this line is sustained in rear by deployed echelons (and it ought to be, because each of its elements ought to form on it). Besides, by this disposition, it will break the cohesion of a too extended formation. Napoleon wrote, "It must never be forgotten that cavalry is more or less on four or five lines."

It is not then the general alignment of its elements which gives strength to a cavalry attack, but their judicious disposition, and in each of them order, compactness, and cohesion.

The word "cohesion" deserves consideration ; the matter of cohesion has only given rise to so many academic discussions because the essential differences which ought to exist between our tactical methods, according as we attack cavalry or the other arms, have been left out of sight. Against cavalry cohesion is necessary, because it implies resolution and a powerful shock, and consequently, produces a moral effect. Against the other arms, cohesion is useless, because the moral effect will result from surprise, and the suddenness and impulse of the attack. Space is wanting for me to give this question the full consideration of which it admits, but I believe that every confidence can be placed on the following words of the master. "In the cavalry fight," says Napoleon, "it is not only pace that ensures success, but order, the general appearance, and the correct employment of reserves."

That being so, I think that the Germans have lost sight of those principles, especially of the last, when thinking out their new formation, and I sincerely hope that one day they will have the opportunity of testing its value.

In view of our struggle with the Germans, we have also some other subjects to think about. The German regiments will probably be mobilised in five squadrons, and in every case their effectives will be greater than ours ; and lastly they will all be armed with the lance.

It would be puerile to ignore the danger which would result, in the shock of two divisions, from this double superiority of numbers and armament. The question of effective strength can be settled out of hand by the issue of instructions held secret till mobilisation. I only insist on them here, to corroborate the opinion that cavalry ought to be endowed tactically with a distinct element for reconnoitring or security detachments.

The question of the lance is quite different, it has excited public opinion. I confess to not being carried away by the arguments of its partisans and its detractors, particularly the latter. It is not a question of discussing the advantages or the inconveniences of the lance as a fencing weapon, nor its intrinsic value, so much as to regard it as a weapon for a mass, that is to say from the tactical point of view. The debate ought not to end at historical examples ; it ought to be carried into the essential principles of the modern employment of the arm. Will there or will there not, at the commencement of the approaching war, be encounters of masses of cavalry ; and consequently, is the fight against cavalry our primary mission and so to speak our cardinal function ? In both cases, the answer must be in the affirmative.

It only remains to us then to enquire, if there is any advantage in placing the French cavalry, armed with swords, in front of the German cavalry, armed with lances. This question brings up the only point which we have not yet elucidated in the cavalry fight: *the question of the shock*. A great deal has been written on the existence or the absence of the shock. Examples have been drawn from history, which prove equally that lines of cavalry never meet, or that they meet and pass through each other. However, it matters little. Where one body of cavalry makes a half turn before another, the reason is that the latter

produces a greater moral effect. Now this effect is the result of resolution, cohesion, and armament. A forest of lances brought down to the engage, produces, in the highest degree, this terrifying impression. It is a threat and produces a moral shock, and that is enough.

The lance then has a moral effect; but its material effect is disputed.

Nevertheless, if two forces of cavalry do meet, it occurs because they are equal in courage and resolution; then it is, that superiority of armament tells, and I do not believe, when it is a question of the encounter of masses, in deployed lines, that the material effect of the sabre can compare with that of the lance. The sabre is, *par excellence*, the arm for the mêlée, but it is too often forgotten that after this material shock there is, for one side, flight, and for the other, pursuit. The main point therefore is to augment the vehemence of the shock. Now the lance implies precisely these ideas of a correctly aligned and coherent charge, and the absolute offensive, which cannot be too much inculcated in cavalry.

In both cases we require the lance, if not for its material effect, at least for its moral effect; we require it because the German cavalry has it, and because we cannot expose our squadrons to the momentary surprise, or fear, or even mere hesitation, which will not fail to be produced by their seeing an arm of greater length in the shock. A week after, or on the morrow of the grand collision, if we find it in the way, we can throw it away; but it will have produced its effect.

All that can be said against its adoption, outside this capital consideration of the cavalry fight, is of no value. To sum up:—*The lance is the arm of the first act; it may only be provisional, but it is provisionally necessary.*

It has been held that it overweights the horse, and that it prevents the man from carrying out his duties as a scout, and that it deprives him of his carbine, and that the reduction in the time of service interferes with his properly learning the use it, &c., as if, in a war with Germany, in the present state of the means of communication, cavalry will have to renew the exploits of the "Grand Army," and march, by stages, from the shores of the Ocean to the banks of the Rhine. As if the problem of the lance added to the carbine had not long ago been settled by the German, the Austrian, the Russian, and the Italian cavalry; as if it were a question of preparing for anything else than the charge!

From this discussion has sprung a regretful tendency to wander into didactic generalities, and to lose sight of the very precise object which concerns us. This object is for us to hurl back the German cavalry, and then dash forward to discover the hostile masses. *Therefore, to fulfil this first part of the programme, we require three elements which are intimately connected, the corollaries, one of the other:—the mass, cohesion, the lance.* From the tactical point of view these elements are inseparable.

After the victory over the hostile cavalry, that raid of cavalry will commence, which is, correctly speaking, *the strategical exploration*, of which the main object is to discover the positions or the movements

of the hostile masses, and as far as possible spread disorder and confusion among them. I will not attempt to study this second part of the rôle of the independent divisions in all its details. The reconnaissance will employ still more vigorous and offensive forms, than when its object was the discovery of the enemy's cavalry. An increased number of reconnaissance parties will be followed closely by masses of squadrons, whose freedom will no longer be interfered with. The aspect of the struggle will be sensibly modified. Lances and cuirasses will play a secondary part; for a victorious cavalry, and one which has got rid of its adversary, will almost be able to do without its instruments of protection and shock. The magazine carbine now enters on the scene.

To turn or get through covering troops, and to penetrate as far as the points of concentration, cavalry will be obliged to move in masses more than ever; but they will have to largely make use of their guns and carbines. The unexpected action of its fire will produce striking results. Without then restricting itself to the exclusive practice of the charge "*à l'a-me blanche*" or of dismounted fighting, cavalry should prepare itself for this double form of action. It should above all reject all pedantry and formalism, and apply itself, with all the means at its disposal, to the final success. Thus only will it be able to point out to the commander-in-chief the plain way which leads to a surprised enemy, and thus to justify the old adage of Frederick: "A good cavalry makes you the arbiter of the campaign."

In terminating the examination of this strategical rôle of cavalry, it may be as well to notice afresh the essential point; which is that, in view of the ideas of our adversaries, the defeat at first of their cavalry is the primary and supreme guarantee of success in the search for their masses; we cannot attempt the second mission, if the first has not been fulfilled. *We must first gain the strategical superiority*, as said Napoleon in 1805 and 1806, and when we have decided to send forward our masses of cavalry to the front and flanks of the armies, *the first condition of this conquest is a victory in the cavalry fight.*

The German cavalry has on its side numbers, armament, and traditions; we must not neglect any of the means which can re-establish the compromised equilibrium. Let us keep cuirasses, let us take both the lance and the magazine carbine (we will easily get rid of superfluous weight after the great struggle), let us send only strong detachments, let us march always well scouted and concentrated, let us be supported, as needed, by groups of infantry, by battalions of "*chasseurs à pied*," pushed as far as possible on to predetermined positions, known to the commanders of the cavalry divisions, in such a manner, that in case of meeting with a superior enemy, they may serve as points of support, to enable us to deliver a vigorous offensive return.

But you will say, "You dread the German cavalry?" We? Not the least in the world. But our commanders ought to dread it; they ought to place us in such a position, so to speak, that we may be assured of victory. Napoleon had a decided dread of the Prussian cavalry in 1806, and he knew how to turn this dread to the best advantage. He held his cavalry massed, as he did the Grand Army itself; all his forces

were concentrated to this extent, according to the neat expression of Prince von Hohenlohe: "He led on Berlin a square of 200,000 men." That is the eternal and essential principle. The first detachments of cavalry were closely followed, and to some extent supported, by light troops of infantry, and thus he obtained the first successes of Schleiz and Saalfeld, the news of which he knew how to spread abroad by means of his orders, his bulletins, and through the newspapers. Thenceforward the French cavalry gained moral force and confidence. He did not hesitate to let loose his masses of cavalry in the plains of the Saale; and we know that after having traversed the battlefield of Jena, they galloped straight up to Berlin.

Having thus reaped the fruits of his skill and prudence, the Great Emperor could then proudly declare in his fifth bulletin: "The French cavalry has no equal."

PART II.—*Cavalry in combination with the other arms.*

The second part of this lecture, on cavalry in combination with the other arms, is the portion of our tactics which offers most interest to officers of the other arms, and is the portion regarding which our regulations are least precise. The inevitable but considerable difference which separates the employment of all the arms combined at great manœuvres from their employment in war is not of a nature to dispel this uncertainty, which became so apparent that it was necessary, in 1890, to publish an official pamphlet on "The employment of cavalry operating with detachments of all arms".

This pamphlet certainly elucidates many obscure points; it is a progress, but no one can say that it closes the debate. I designedly say "the debate," for manœuvres of all arms have up to now afforded the only positive instruction that we have been able to obtain, and that is, that infantry reproach cavalry with not furnishing them with sufficient information, to which the latter reply that they are never placed in a good position to do so. This misunderstanding cannot injure the feelings of close friendship which animate us, but it may injuriously affect our mutual confidence, of which the first element, according to General Dragomiroff, is "knowledge;" he adds that "it ought to be a matter of common knowledge what each one can do for the mutual safety, and to what extent he knows the way of doing it."

We do not know the other arms enough; that is our weak point. But it must be acknowledged that the other arms are, as regards us, in the same state; in fact we all err, more or less, through exclusiveness. Now, as officers, we owe each other the truth, even though the truth spring from our faults. I do not believe that the garrison lectures were originated for any other object. To treat each other as sincere friends, we ought to tell each other our failings (from the tactical point of view, be it understood), and point out to each other our weaknesses: we ought to seek, together, to what extent and in what manner we may participate in carrying out our common duty.

I consider that we should, first of all, reject as unpractical that system which consists in adding, either at manœuvres or during regimental

tactical exercises, to an infantry unit (brigade, division, or army corps) the amount of cavalry which, according to our organisation, forms part of it, and in making these two groups, thus coupled together, work. It is a conventional amalgamation, applicable only to peace exercises.

In the consideration of war as it will be in the future, either during the concentration of the armies, or in their closing up march, or in the collision, it is hardly possible to think otherwise than that the isolated employment of detachments of this kind will be exceptional and provisional. To find an example we should have to return to the Revolutionary Wars. Then the divisional system was in full vigour. The infantry divisions used to march accompanied by their regiments of cavalry, which were well calculated to enrich their annals by lofty individual actions; but they showed themselves powerless to produce a great result as a whole.

The genius of Napoleon created the concentration of these scattered units; and then the cavalry of the Empire, in one single intervention, in advance of the armies or on the battlefield, rendered more service than the regiments composing them had, despite their heroism, been able to render in several years. That seems conclusive. Napoleon moreover only followed the process employed by the great master of squadrons of the preceding epoch, Frederick the Great. On the other hand, at the same time, that is from 1806 to 1815, the Prussian cavalry, forgetful of its own traditions and scattered among the brigades and divisions of infantry, had everywhere succumbed. These causes and effects are intimately connected with tactics in general, and account must be largely taken of them when we study the particular tactics of one arm.

It is an axiom that small means lead to small results. Even under the Empire, detachments inferior to a division were hardly allowed, and only then to a short distance. In our time, with increased effectives and the extreme concentration which is foretold for the future, the fighting units have lost their old relative value. This division, which used to be an essential unit, is lost in the bulk of the whole; the army corps is the smallest unit that seems able to march or act isolated.

Without entering into the strategical considerations which evidently repose on suppositious data, it is allowable to presume that modern armies will be composed of two, three, or four army corps; and consequently that each of these corps will usually march and fight as part of a whole. In fact, the modern tactical unit will be the army, the army corps becoming a secondary piece on an immeasurably extended board. In this general organisation, what will be the place which has devolved on the cavalry of the army or of the army corps?

The classical standing point on which the subdivision rests in time of peace or at manœuvres will be, if not rejected, at all events modified. A clear conception of the mission of each column will govern the fresh subdivision. Thus, in the Napoleonic wars, besides the large masses united in reserves or in special corps, the cavalry was properly distributed among the different corps of the Grand Army. But this distribution was not fixed in a rigid proportion; it followed from the

circumstances and necessities of the campaign. For example, in 1809, certain corps, the 7th and the 9th, had five regiments of cavalry ; others, the 2nd and the 4th, only two or three squadrons.

The character of future wars will require a still more elastic application of the same principle. At the commencement, the entire cavalry, or very nearly so, *will be at the disposal of the commander-in-chief*. After the first battle, the cavalry will be divided between the armies. In each of these, the commander of the army will not, in all probability, deprive himself of the aid which a powerful mass of squadrons can afford him, by disseminating them in equal groups among the army corps or divisions ; but he will doubtless endow these units with more or less cavalry, according as they are more or less exposed and isolated. It is only in the small operations of war, which follow the collision of the armies, that we can foresee the employment of feeble groups composed of the different arms.

The word "combination" then is an elastic term, the signification of which is at first very broad, in fact so broad as to be capable of application to the so-called independent cavalry even, when they are working for the benefit of the armies, and consequently are, through community of object, in combination with them. But this combination is gradually reduced to closer proportions, according as the war extends and develops, and as the strategical detachments become more numerous and less considerable. By the expression, cavalry in combination with the other arms, we mean then any kind of detachments ; the principles which ought to govern these different detachments in their rôle and their employment are identical.

Cavalry in combination with the other arms operates in three methods, determined and fore-seen by the regulations :—

- 1st.—It is employed for the duties of security only ; the duties of exploration being assured by the "independent" cavalry.
- 2nd. -- It accompanies columns operating isolated, and consequently carries out simultaneously the duties of exploration and security.
- 3rd. - It intervenes on the field of battle.

1st. Cavalry employed in the duties of security.

As it would take very long to examine in detail the working of cavalry in ensuring security, which is moreover treated of in "The duties of armies in the field," I will content myself with putting forward the great principles, the application of which ought to be permanent.

Numerous attempts have been made to codify the dispositions for security, but not one has succeeded. Three regulations, now done away with, and several generals (among them a military writer whose competence is shown by his numerous writings) have vainly tried to solve the problem. The last mentioned had not even the satisfaction of seeing, in the manœuvres which he directed in person, the successful working of the ingenious system which he had created in all its details under the name of "reconnoitring tactics."

It is impossible to enclose in *formulae* matters, the application of which is affected by circumstances and ground. In war, these circumstances and grounds demand, not only dispositions, but logical, rational, and appropriate dispositions. All these screens, conceived for an open country, split up and are rent when applied in moving over varied and broken ground; they ought also to be modified according as the column is more or less isolated, more or less part of other troops, and close to or far from the enemy. To wish to fix them in one rigid form is like trying to fix the outline of a flickering flame. Let us take a broader view, and only seek to hold on to true principles, and not to *formulae* applicable only to conventional circumstances.

The first duty of a body of cavalry employed in duties of security is to cover the columns to deploying distance; that is to say, to be able to report the enemy in sufficient time to allow of fighting dispositions being made. That is the key of the arch: all the rest are accessories.

This consideration, moreover, fixes the distance at which the line of scouts should move, and also the position of the reserve, *which should be placed at the most threatened point*, and not at that fictitious point called by the regulations "the centre of the screen." The object of this reserve is not only to keep the security parties at full strength, but especially to oppose all attempts of the hostile cavalry to break in. For the commander of the column which it covers, it is an offensive and available force, on whose assistance he can call when circumstances require.

Cavalry employed on duties of security ought to retain freedom in the matter of pace, on the sole condition of keeping up connection with the column. It moves by a series of successive leaps, quickly passing over easy or open ground, and halting on lines of obstacles for observation; in short, it ought to form a series of successive screens in front of the marching columns. This process always holds good for the line of scouts. As regards the reserve, which is comparable to the centre of gravity of a corps in movement, it moves according to the situation of the moment, and in accordance with the continually changing state of affairs.

To sum up: "Protection to such a distance as the time of deployment requires; the position of the reserve fixed tactically, that is, appropriately; freedom of pace and utilisation of ground to establish successive screens." These are the primary considerations that should regulate the employment of cavalry in the duties of security.

2nd. Cavalry with isolated columns.

With the second part of the regulation programme, we arrive at the special operations of a campaign, either those operations which result from particular expeditions, or which ensue from the general aspect of the war, which, being prolonged, ends by extending all over the whole country. In every case it is a question of detachments composed of the various arms.

Cavalry accompanying isolated columns must carry out simultaneously the duties of exploration and security.

It is worthy of remark that the German regulations do not make this difference between the cavalry of security and the cavalry accompanying isolated columns. The Germans hold that, in the future war, all columns will be more or less preceded by troops carrying out generally the duties of exploration. However, since it is necessary that the considerable extension of this duty has to be provided for, their regulations ordain in a general manner, "To push forward the mass of cavalry, which is included in the organisation of the units composing the column, in advance of the advanced guard." And further, "This is the best way of ensuring security."

For the immediate security of the head and flanks, they employ small fractions, which, according to the case, they call cavalry of the advanced guard or of the outposts. In fact, between this security group pushed in advance of the column and our exploration group, there is only a nominal difference.

But it is precisely to define this particular "exploration" duty for an isolated column (to some extent, a secondary duty, working for the benefit of the column and within limits fixed by the sphere of action of the column), that the pamphlet of 1890 originated the special term of "cavalry in reconnaissance." This previous explanation was necessary, in order to clearly define the double aspect presented by this particular situation.

Cavalry attached to an isolated column is generally divided into two groups: the first, as strong as possible, reconnoitres; the second, reduced to a minimum, performs the duties of security at a short distance from the column. The division of the cavalry into these two groups, which, according to the "Duties of armies in the field," belongs to the officer commanding the cavalry, has just been judiciously restored, by a correction to the pamphlet of 1890, to the commander of the column. As a principle, the centre of gravity, the compact mass, is placed in the group which reconnoitres. Exceptionally, that is when the cavalry detachment is so weak that it cannot form a main body, instead of the reconnoitring portion, strong enough to fight, either with the cavalry which the enemy presumably has, or with his security troops, we must be content with pushing out some reconnaissances, and with strengthening the portion which carries out the duties of security at a short distance from the column. In short, *the division of the cavalry will result, not from a ready made formula, but from the circumstances of the situation.*

It remains to elucidate a point which has not been cleared up by the "Duties of armies in the field," or by the pamphlet of 1890.

This obscure and delicate point is the degree of independence allowable to the reconnoitring portion of the cavalry. This independence, says the text book, is relative; it is measured by the sphere of action of the column. In every case the cavalry commander ought to keep within the spirit of the orders given him: these orders are:—the *order of march* of the column, giving general information, and a *particular order*, laying down precisely the operation entrusted to him. The commander of the cavalry, thus directed towards the object to be

attained, ought to have the greatest freedom in all that concerns the execution of his mission. In a word he ought to be "independent."

This word requires explanation. In this place, it appears to run counter to the idea of connection, which ought to be the basis of this duty of cavalry; yet within limits, it is a question of independence analogous to that enjoyed by the masses of cavalry which are sent on the strategical exploration. Distances only differ, as do the zones of action, but the general law holds good; from the moment when a detachment of cavalry is launched on a voyage of discovery, be it a large mass or only a small group, it becomes dependent on its objective and independent of the column. It is the duty of the leader of the latter, (commander-in-chief or divisional general) to limit this independence by a precise definition of the given mission.

As has often been said, the cavalry in advance of an army is the pack of hounds in front of the field. If you wish them to hunt the stag and pull him down, you must let them fairly alone, but you must let them alone judiciously.

And this consideration is essentially subject to limitations. I repeat, it is obligatory on the leader of the column to himself fix the degree of independence of his cavalry. He knows his object and does not wander about at hazard; to him then belongs the duty of telling his cavalry what he wants from them, and of pointing out their objective, and limiting the bounds of their mission. Only after this does it become independent, that is to say free to employ such means as circumstances suggest, and no longer dependent on anything but the objective which has been indicated to it.

To resume my comparison, I would say that he would be a very poor huntsman, who, wishing to hunt a stag of ten, allows the pack to chase a brocket.

And just as it is necessary to put hounds on the right scent, so must cavalry be clearly told what is required of them.

To sum up. *On the precision of the orders of the commander of the column depends the degree of the independence of the cavalry, and, usually, the success of their exploration.* There are few examples where cavalry has not carried out missions which have been clearly stated to them, but there are many where, when, delivered over to chance, with vague and general indications, it has wandered haphazard and at the expense of great fatigue, the results have been small. Thus understood, that is after a formal indication of the objective, independence is not a danger but a strength. In fact it is entirely relative, and is limited to choice of means. This is true, whatever be the detachment of cavalry and the body to which it is attached, that is to say, that *the relative degree of independence, as regards the commander, applies as well to a corps of cavalry operating under the orders of a commander-in-chief as to a regiment sent out to explore by a divisional general.*

As regards the group charged with the duty of ensuring security at a short distance from the column, I believe that I am the mouthpiece of officers of other arms, when I say that what they wish above all is *not to be protected materially but visually*: that is, to be warned in time

not to march in the unknown, to have on the flanks and in front, not forces ready to stop the enemy, but eyes always open, ears always watchful, a warning, watchful screen.

Therefore the dispositions which these duties permit us to render do not require a drawing, nor are they a matter of memory, but the clear conception of our mission. The cavalry commander ought then above all to thoroughly understand the situation, and not attempt the barren application of a theoretical *formula*; he ought to act on his own initiative, and not seek to shelter his responsibility under the text of the regulations. The essential point is to surround the column with light watchful groups; it is a question, not of defending, but of warning.

Such ought to be our line of conduct. That of the commander of a mixed column may be summed up in three precepts:—Not to wish to place cavalry everywhere, and consequently, not to split it up into small detachments, for dispersion is weakness; to give us a precise mission, to tell us what he wants; and lastly to leave us completely independent as to the choice of means. To sum up: *concentration, brevity of orders, precise instruction as to the object, and entire liberty of execution.*

3rd. Cavalry on the battlefield.

In proportion as the columns get closer to the enemy and a collision becomes imminent, every leader of cavalry is haunted by a fresh preoccupation; that of intervention in the final drama, the battle. Now he leaves small groups on the front and flanks, to ensure security, and recalls all superfluous detachments to himself. He holds himself *au courant* with the operations, and prepares to play his part there.

In this theoretical conception of the rôle of cavalry, I do not wish to lay down in any way the distribution of this arm. The expression, "every leader of cavalry," is extremely elastic. If we regard the great battle between armies, it applies to the commanding general of the mass of cavalry, under the orders of the commander-in-chief; if it is a question of one army, it would be the commander of one single division of cavalry. It would apply to the commander of any force of cavalry whatever, if we regard minor operations. However, in every case, within limits, the line of conduct and the principles remain the same.

In the second part of its task, the cavalry leader ought to be imbued with the principles contained in the drill book, and particularly in the remarkable "report" which precedes it: "When cavalry is working in the second line it is subordinate to the other arms, of which it becomes the auxiliary; it supports itself on them instead of covering them, *it seeks the region of action most profitable to the whole, and it intervenes, not only in partial efforts, but as suddenly as possible, and with its whole numerical strength.*"

The rôle of cavalry is briefly traced in these few lines; it is linked with the general course of the operations, for it ought to be *profitable to the whole*; its real point is brought out, because it is no longer a question of an incidental objective or a partial effort, but of a general aim, the intervention with the maximum of its *numerical strength*.

Lastly, the characteristic of surprise, its moral effect, is evoked, for cavalry ought to intervene *as suddenly as possible*. These indications then are really practical, and comprise all our rôle: the *tactical action of cavalry on the battlefield ought to be profitable to the whole, and it ought to act by surprise and by masses*.

To play this rôle well, the head and arm ought to work together, the one ought to see and the other to act. This distinction indicates up to a certain point the methods. The force massed under cover from fire awaits the moment to intervene: the leader with his own eyes and with those of his reconnoitring officers, watches for the opportunity. Cavalry therefore ought not to waste its strength in useless marches to and fro, but its officers ought to incessantly show the greatest activity in finding for their arm a chance of intervening in a manner profitable to the whole, that is, of intervening in a tactical manner. We now have to see how this theoretical desideratum can be practically attained.

Of all the duties which our arm ought to and can render, that of participation in the battle is the most disputed. Against this participation, the opponents urge the progress in ballistics, the infinite perfection in fire-arms, and above all the invention of smokeless powder. Arguing by the book, we, by deduction, seem condemned, before proof, to impotence. I say "before proof" intentionally, for this argument rests, not on an analysis of the facts of war, but purely on didactic reasoning. It appears all the less conclusive to us, because a detailed study of campaigns and the part played by cavalry in them proves that the extension or diminution of its rôle is never the result of variations in armament. If it were so, its value would have been a decreasing quantity ever since the discovery of fire-arms. But on the contrary, after several eclipses, we see it suddenly reappear under Frederick the Great, and shine most brilliantly under Napoleon, in fact under all great leaders of men who have wished, and known how, to employ it. How could the cavalry of the First Empire have gained successes as astonishing as those of the Roman cavalry, if the armament had been the regulating factor? And nearer our time, in 1866 and 1870, on the rare occasions when it was decided to call on cavalry to intervene, it produced considerable and surprising effects.

At Custozza, 16 Austrian squadrons, throwing themselves on the heads of the columns of the 3rd Italian corps, directly they appeared on the scene, disorganised and paralysed them for the rest of the day. All the Italian regimental lecture rooms contain a picture of this episode in this battle, during which, to escape a sudden onslaught of the hostile cavalry, Prince Humbert was obliged to precipitately take refuge in the middle of a square. At Königgrätz, two divisions of Austrian cavalry, dashing on the victorious Prussian columns, prevented a defeat being turned into a rout. At Vionville, the historic charge of the six squadrons of Bredow's brigade arrested the offensive movement of our 6th corps, and allowed the Prussian Staff to bring up fresh troops into line, and re-establish the disturbed equilibrium.

To this it has been objected that these heroic squadrons were almost annihilated. It seems to us that those who use this singular

argument forget the *tactical results* which these necessary sacrifices produced.

Cavalry should not be credited with the extraordinary pretension of immunity from the destructive effects of fire, for the results which it obtains can never be measured by the material losses which it undergoes. At Marengo, at Aspern, at Eylau, at Borodino, cavalry, almost "*en souveraine*," decided the fate of the day, without its having for all that done any great damage with the sabre, while it suffered enormously itself. But it did better than sabre, it changed the face of events; it weighed down the tactical balance in favour of its own army, and hastened the *dénouement*, and by this fact spared the other arms many sacrifices. *A leader of cavalry then ought to be imbued with the tactical idea, that is to say, with the idea of intervening in a mass to aid the success of the whole.*

It involves the narrowest and falsest conception of the art of war to measure the value of an arm, as a fighting instrument, by the material losses which it can produce or to which it may be exposed.

Let us look at Borodino for example. That assuredly was a battle where cavalry was devoted to the most sanguinary sacrifices. Most military writers have reproached Napoleon for having exposed this arm too much to the Russian guns; but these writers have not thought that, at this time, the Emperor needed at any cost a decisive victory; his object was what it ought to have been, the annihilation of his adversary. He wanted his cavalry under his hand, and in spite of their artillery he kept it close, in order that it might promptly receive his orders; which was logical. Everything else ought to give way to this consideration. If Napoleon deserved a tactical reproach, it certainly was not for having thus exposed his cavalry, but, on the contrary, for having, by a prudence foreign to his character, too much economised his reserves. If he had showed as much decision in engaging them as he did in launching his cavalry, he would have accomplished the annihilation which he wished; he would not have gained an indecisive victory, and the fortune of this disastrous campaign would perhaps have been changed. In short, it would have affected mankind.

As regards the glorious squadrons which lost three quarters of their strength, at whose head fell Montbrun and Caulaincourt, they obtained results in proportion to their losses; they forcibly seized the wished for solution, and were therefore well employed.

But if the peculiar character of the cavalry fight demands great material losses to produce a purely moral effect, we must then only make use of it knowingly; and we protest against the tendency to charge in season and out of season, without any tactical object or any notion of the good of the whole. This spirit is commendable in the ranks, and must be utilised at great manœuvres for instruction. But a cavalry commander, in handling masses in the future war, will have to act as a leader, and not as a subordinate.

The time is passed for individual acts of prowess. In the modern battle cavalry can no longer do great things by doing many things; it ought not to multiply its enterprises, but it ought to execute those

which it does undertake with the maximum of its material strength and its moral impulse. Thus only will its intervention have far-reaching effects.

The following are marvellous instances of the employment of cavalry :—Colonel Pulz' charge at Custoza ; Bredow's brigade at Vionville ; the Grenadiers of the Guard at Eylau ; and Kellerman at Marengo. Compare this rational and logical intervention with the most brilliant feat of arms of cavalry when a tactical object was wanting, as for example, the charge of those four Austrian regiments at Avesne-le-Sec on the 11th of September 1793, which penetrated and dispersed a column of 8,000 men. What influence had this isolated act of prowess ? None. What profitable results to the operations in general ? Not even the same which might have affected the morale of the enemy. But conceive this feat of arms performed at the psychological moment of a battle, and see what a crisis it might have provoked.

Here is the shade of difference that I wish to bring out, in order to characterise the employment of cavalry in the battle.

But it is not enough to adapt this employment to tactical circumstances ; we must also consider it in reference to what the size of our objectives will be in future.

I have often heard a theory upheld, which I call the "theory of small parcels ;" it is the idea that some squadrons placed here and there, a few everywhere, in folds of the ground, will often find the opportunity to surprise and sabre, here a battery, and there a line of skirmishers or a detached company, &c.

All this is partisan warfare. I admit it is very useful at manœuvres, for instruction, to render our squadrons "keen." It will also be useful in small operations which arise at the commencement and during the continuation of a campaign, but on a modern battlefield it would be out of place, because the expenditure would bring us no corresponding benefits. Add all these "out of place" luxuries together, and you will get no good by them.

If we ought and if we can place bodies of cavalry in the intervals between the fighting units, they must be bodies large enough to produce a tactical result, and one profitable to the whole ; if it is not, the dissemination is only formal and barren.

Our drill book certainly admits this possibility, but under such circumstances as render the occurrence of it very rare. After advising that cavalry should be massed at the wings, it adds : "In certain cases however, cavalry may be made to participate, in more or less large bodies, in the different phases of the infantry fight. If cavalry has been placed in such a manner as to intervene rapidly in the struggle, and is hidden from the view of the enemy up to the moment of engaging him, there is no doubt that its sudden onslaught will produce a great effect and will sometimes obtain great results."

In Napoleon's time, the cavalry brigades of the army corps were placed, on the battlefield, at the disposal of these corps ; but then they could be kept at a distance of 1,200 or 1,500 metres from the hostile lines, that is to say, "within reach of receiving orders promptly and

intervening rapidly." The Emperor placed the great cavalry reserves himself close to the point where he wished to provoke an issue.

Nowadays, the depth of the zone interdicted to the posting of cavalry has more than doubled. It will usually be impossible to place them, in the line of fire, closer than 2,000 or 3,000 metres from the line of battle, without devoting them to severe losses and to demoralisation in anticipation. However, it may happen that in certain circumstances, and particularly in ground favourable to the action of this arm, it may be useful to have some cavalry ready to intervene. It is then a tactical necessity to which we must submit, whatever be the preliminary losses to which the cavalry will be exposed. Have we not seen Napoleon keep his cavalry for a long time under fire of artillery before letting them go? In the twinkling of an eye they reaped the fruit of this long delay. But it was only knowingly that he acted thus, that is, with the formal intention of making use of this arm.

Such circumstances are very rare. The ordinary and the most unfavourable case must be contemplated: that where the masses of "battle cavalry" (those whose intervention, as well by their numbers as by their moral effect, will really produce wholesale results) are placed on the flanks. Then they must not prowl about vaguely, haphazard, to seek some action or other, or a cavalry fight. They must be imbued with the incessant desire and the fixed resolution of finding "this region of action the most favourable to the whole," which the regulations, in default of the commander-in-chief, point out to them as their principal objective.

Nothing then of that interminable darting about, none of those eccentric turning movements which remove the cavalry from the battlefield, but, on the contrary, an invincible tendency to get closer to the guns, and to penetrate into the zone of the living fight, and to appear at the decisive moment.

These conditions create for the cavalry leaders the obligation of constantly watching the progress of the fight. By means of their officers' reconnaissances, they will have to follow step by step all the turns of drama, and to vigorously draw nearer when they feel that the moment has arrived for them to enter on the scene. Then cavalry will have to throw themselves into the *mêlée* with the whole of the impetus which the long delay has enabled them to store up. They will only have been kept under cover in order to act better and more vigorously.

It is in this manner that the German cavalry of to-day is exercised to seize again the glorious and historic rôle of the horsemen of Frederick and Napoleon. At the Imperial Manœuvres of the last few years we have seen whole cavalry divisions appear in the middle of the fight, and intervene in masses against the other arms.

But to do this we must know how to save cavalry, and must not split them up into weak bodies, and not expend them, and uselessly tire them in partial and local efforts.

"Cavalry in the battle," said to me one day a general whose authority is unquestionable, "is the bouquet of flowers which you offer to your ladylove. The young man, the novice, the stupid man (Mr. Anybody),

will often buy an inferior bouquet, and will carry it himself, either driving or on foot, through the sun and the dust: it will produce a very poor effect. But he who knows and has made a study of woman, the smart, nice man (the man of the world in fact), will choose the very best bouquet, and will keep it carefully covered in the shade; he will have it carefully carried, and well protected, and will only uncover it at the exact moment when he offers it; it will thus have kept all its freshness, all its perfume, and all its brilliance."

I know no more expressive image to represent the difficulty of and delicacy required in working our arm.

I have chosen the most unfavourable hypothesis, that where the commander-in-chief has not himself pointed out to the cavalry their tactical goal. Men like Frederick and Napoleon "composed" their battles while taking account of the *cavalry element*. In their hands the reserve of cavalry was a formidable missile, which they wished to launch themselves on *their* objective at *their* moment. In this case our tactics are so simplified that it is not necessary to insist on it.

But in no circumstances will a cavalry leader be able to shelter himself under the absence of orders or formal indications, and remain inactive. Initiative and activity are your *raison d'être*, and constitute the basis of our tactics. Our regulations contain the following rule, which will always hold good: "One thing only is infamous, inaction."

What moments of the battle will claim the intervention of cavalry? The regulations as a principle indicate all: during the preparatory duel of the artillery on the arrival of the columns, during their deployment, at the moment of the assault, in the retreat or in the pursuit.

It does not fall within this study to examine these different situations, but some of them are striking. Who among us has not reflected on the importance which the prelude of the battle in the future will assume, in these armies of such immense size? By this word "prelude," I do not only refer to the mighty shock of the two exploring cavalries, according to the issue of which one side will be endowed with sight and the other be blind. I do not wish to conjure up the idea, however striking, of the frightful disorder overtaking masses set in movement in the wrong direction; I wish to speak of a prelude, more immediate and not less grand, of the gigantic artillery struggle with which every great battle will begin.

Its occurrence is not in doubt. The German army has accepted its principle by massing all the artillery at the heads of the columns, in order to admit of its rapid entry on the scene. We have been obliged to follow in the same track; and already it can be foreseen that it will not be only the batteries of the army corps of the first line which will take part in the prologue, but also those of the corps in reserve.

Then, with the present methods of fire and projectiles, and with smokeless powder and melinite, in a few instants complete disorganisation of one of the two rivals will ensue, and, with that, the annihilation of one army. It is asked (at least the gunners ask) if an army, deprived of this material and moral adjunct, will be able to enter into the struggle with any chance of success.

As proofs I will only adduce those human documents which a colonel of infantry has just brought forward in a remarkable lecture : those guns, collected on the battlefield, either not loaded or loaded a dozen times over, with very improbable sights. What more manifest sign could there be of confusion, terror, and loss of presence of mind ?

Colonel Rivière said, at a lecture on infantry tactics, delivered at Rouen in 1891: "During the War of the Secession, 24,000 loaded arms, belonging to one or other of the adversaries, were picked up on the battlefield of Gettysburg in Pennsylvania. Only one fourth of these arms were properly loaded ; half of them contained two charges, the remaining fourth contained from 3 to 10. Some arms had 5 to 6 balls to one charge of powder ; in one smoothbore were found 22 balls mixed with powder. Here certainly were men who never could have aimed or changed their sights. It is to be regretted that observations on this head were not made in the 1870 war. They are a proof that on the battlefield things do not happen in the same way as the theorists and the practitioners at the butts imagine."

You will say that, since then, the mechanism of the rifle has been simplified. But men have no mechanism in their breasts ; the heart is always accessible to the same emotions ; it cannot act with the same regularity, when death is hovering invisible in the sky.

The very perfection of fire-arms, corresponding as it does to the reduction in the time of service, makes their management more difficult. With three-year men, do you think it will be easy in the hour of danger, I do not say to regulate the fire or the expenditure of ammunition, but simply to make them bring their rifles to the shoulder in a horizontal position ? At our great manœuvres, in situations that are somewhat urgent, we find it difficult to make our men, simple as it is, draw swords. They look at us, hear us, but stupidified, do not obey ; they require a minute to pull themselves together ; but a minute means 440 metres at the extended gallop. Luckily, horses have no soul, and when let go, they do not stop. That constitutes our strength and our weakness ; that permits us to make the same confession of faith as the old Field Marshal von Wrangel made just before the wars of the Empire : "No, the hope of accomplishing lofty deeds will never die, so long as battlefields present ground that is uneven, covered, and permits of surprise ; so long as the noise of the battle and danger deprive the comparatively weaker spirits of decision ; so long as our adversaries are men to whom the approach of a charge is not the same as a target."

Von Wrangel added also : "So long as clouds of smoke hide the fight." The clouds have disappeared, but experience alone will show whether cavalry have gained or lost from this modification of the physiognomy of the fight.

Every cavalry soldier, who is conscious of his strength, ought to be imbued with the conviction that a body of infantry, which is surprised at a distance of 500 or 600 metres, is lost ; for in the shock and in the *mêlée*, a cavalry soldier, multiplied by the mass and quickness of his horse, is worth 10 foot soldiers, not only from the material losses that his sabre inflicts, but also from the moral effect and the confusion which

he produces. This is so true, that weak groups of cavalry have been known to overthrow, in their flight, adversaries, whom they would have hesitated to attack in cold blood, and to produce, without wishing it, much greater results than they could have imagined.

The fact is, that a battle is not only the collision of two numerical quantities, or the trial of two kinds of armament, or of two systems of tactics: that is its material side which is capable of perfection; but it is also the shock of two minds and two resolutions, the struggle of muscles and nerves, in short, the turning to account the human element in all its power and depth. That is its psychological and unchangeable side.

Cavalry also, whose principal means of action is moral effect, ought never to let an occasion pass of profiting by this peculiar characteristic of its tactics. And therefore it is permissible to conclude that the basis of its tactics is not in the regulations, but in the brains of its leaders and the hearts of its men.

But you will ask me, where is this philosophising on war to stop, if you reject all didactic instruction, and regulation formations, and if you refuse, through fear of formalism, the aid of those theories which nevertheless are the fruit of experience? Here. The book ought to furnish the principles, but the principles are themselves worth only the value of the men charged with applying them, for the regulations prepare the instrument and the leaders employ it.

Well then, whatever be the book (and I would dare add, in spite of the book), if the leaders combine, with a clear conception of the tactics of their arm, moral and physical aptitude for command, cavalry will always be ready to undertake anything and to succeed everywhere. *The best is useless when badly employed, the worst becomes heroic when it has a leader at its head.*

That is the essence of experience. An inferior workman will do bad work with the best tools, while an artist will turn out a masterpiece with an inferior tool.

Never was the Prussian cavalry better instructed, better mounted, better drilled, never were its leaders more learned and more versed in the art of didactic *formulæ* than in 1806, on the eve of Jena. Before it was the French cavalry, a creation of yesterday, inferior in men and horses, but having at its head young eager leaders, the Murats, the Lassalles, the Montbruns, the Colberts, and at the very head, giving the impulse and pointing out to all the exact idea of their rôle, Napoleon.

The French cavalry made its *début* at Saalfeld, and its crowning appearance at Jena, and then, with the sabre at the back of the enemy, giving him neither repose nor truce, capturing his convoys and guns, overthrowing his columns, seizing his fortresses on the way, galloped at one stretch into Berlin.

Notwithstanding the time that has elapsed, notwithstanding all our progress, these examples of our forefathers still convey to us great and fertile lessons. They show that we must seek elsewhere and higher than in the *formulæ* of theory for the elements of success; they teach that the main strength of cavalry will always reside in the head, in the leadership, and less in technical erudition than in breadth and clearness

of views. They teach also, that between doctrinal science and the manner of employing it, is a great gulf; in short, that *in tactics the book is nothing and the man is everything.*

Conclusion.

Cavalry in accomplishing its "strategical mission" has, for its final objective, the mass of the hostile armies. To reach this objective, it will have to walk over the German cavalry. This mission then comprises two phases of exploration, separated by an inevitable fight between the two cavalry forces. This fight will result from the situation itself, and not from a search after a theoretical solution: but, by reason of its importance and difficulty, it will be the main object of the tactical education of cavalry.

Concentration is the directing principle of the employment of cavalry. During the exploration, this principle demands the constitution of strong masses of cavalry, preceded by strong scouting parties, the whole organised, not according to some theoretical idea, but according to the particular circumstances, and in view of a precise object. The closing up march requires a simple formation, as far as possible in square, the fighting units being kept intact and whole, the advanced guard and detachments being furnished by distinct and autonomous bodies.

Cavalry tactics rest on the moral effect gained in the fight between the two forces of cavalry, by massing, cohesion, and the power of the arm of the shock. These three factors are, jointly and severally, complements one of another; the mass implies cohesion, and cohesion implies the lance. In the fight against the other arms, moral effect results from surprise, produced either by the impetuosity of the charge, or by fire. *In every case, the prime factor is the value of the leading.*

When cavalry is working in connection with the other arms, its sub-division and its employment ought not to result from organic principles or the conventional *formulæ* of peace, but from the circumstances of the campaign and the necessities of the moment.

The principles that ought to guide a body of cavalry employed on security duty are, the *protection of the columns to such distance as is required for their deployment, tactical choice of the position of the reserve, utilising the ground to form successive screens.* Those that ought to govern a body reconnoitring are, *clearness and precision in the orders received, and independence.*

This independence ought to be limited to the zone of action of the column, in all that concerns its object, but it ought to be absolute in all that concerns the means.

In the battle, cavalry ought to aim at obtaining tactical results, that is, results profitable to the whole; it should not try to gain partial successes, but general advantages. The characteristic of its intervention is always moral effect, of which the principal factors are impetuosity and surprise.

Under all circumstances, in the strategical as well as the tactical rôle, the influence of its leaders being of more effect than the influence of the regulations, *the principal strength of cavalry will always rest on the worth of its leaders.*

To sum up. As regards the employment of cavalry, there are good and bad ideas : we must keep the former and combat the latter. We must progress towards concentration and initiative, and set our faces against dissemination and formality.

If it is desired to convert into facts the theoretical ideas which spring from this study, we may foresee and more or less lay down the following reforms :—

*1stly. As regards the leading :—*Unity of direction corresponding to unity in employment, which means unity of ideas. The adoption of a permanent process, not in the way of rejuvenating, but in the selection of the cadres.

*2ndly. As regards organisation :—*The suppression of the organisation in independent and corps cavalry, the whole being divided into two kinds—heavy or fighting cavalry, and light or scouting cavalry. Forming into divisions the whole of the fighting cavalry, which is required to act successively as independent cavalry under the orders of the commander-in-chief, and as the cavalry of the army. Strengthening the independent divisions by adding to their fighting brigades supplementary bodies for scouting purposes.

*3rdly. As regards armament :—*Making the armament appropriate to the various objectives of cavalry, that is, the adoption of the lance for the fighting cavalry, and of the magazine carbine for all the cavalry. Educating them to the successive use of both weapons, the one against cavalry, the other against the other arms.

*4thly. As regards instruction :—*Unity of doctrine conformable to modern tactics in general, and based on the double rôle of cavalry, acting sometimes as the strategical and sometimes as the tactical instrument. The education of the whole of the cavalry in the tactics of masses.

*In the domain of exploration :—*Extension of the principle of concentration, the adoption of the “condensed troop” as the type of a body of scouts. The special education of scouting bodies and especially of officers in reconnaissance.

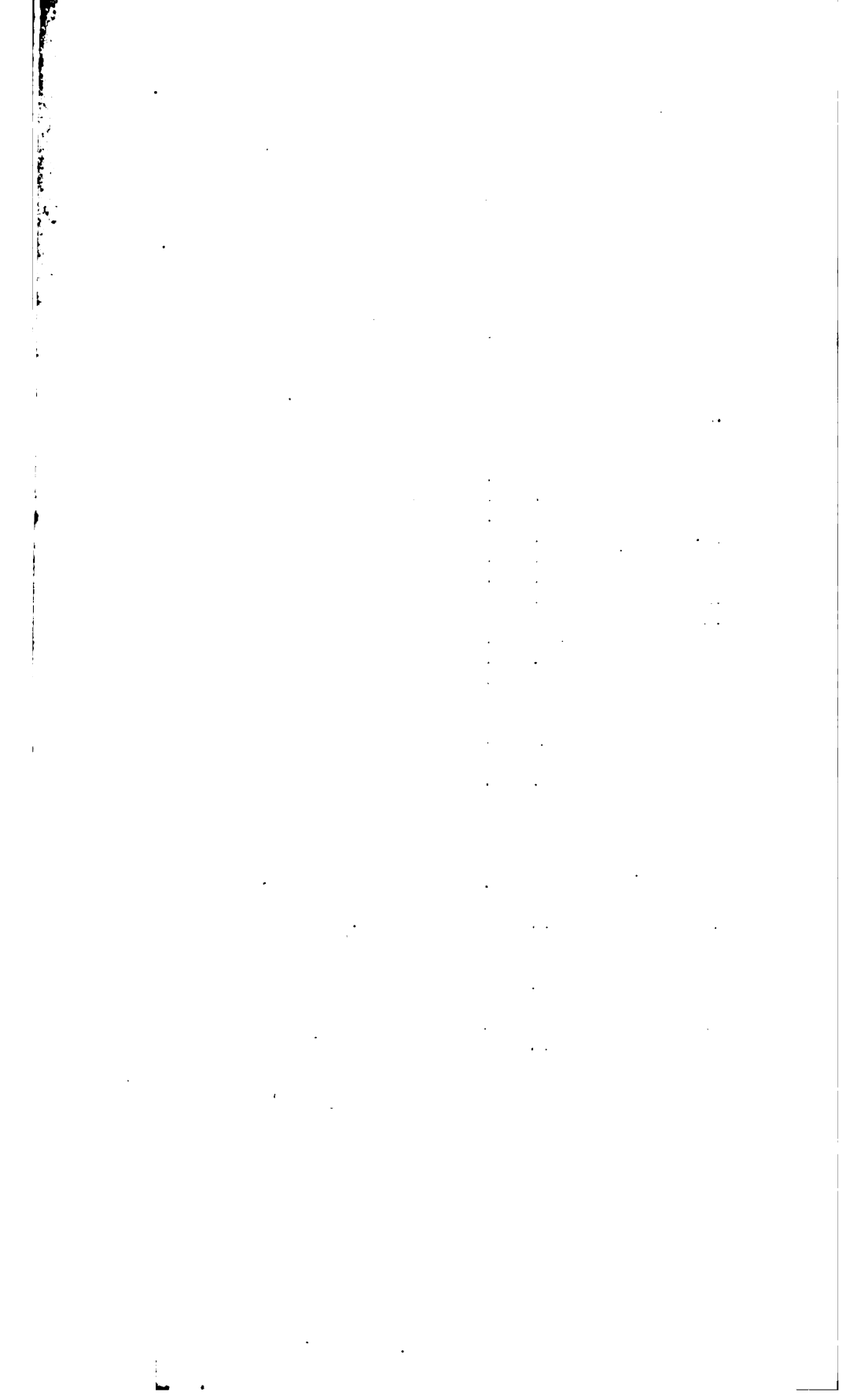
*In the domain of the fight :—*Rejection of a normal formation, and the absolute distinction between the principles of the fight against cavalry and those of the fight against the other arms. As a corollary, and according as cavalry attacks its own or the other arms, to seek moral effect by the mass and cohesion, or by impetuosity and surprise.

*In the domain of the regulations :—*Simplification of drill and manœuvre. The rejection of all the pedantic precepts still contained in the drill books. The extension of the principles of initiative and responsibility.

Lastly, in a general manner, precision of instruction in view of a precise object. The substitution, in place of ideal and vague tactics of a positive system of tactics, appropriate to the exigencies of a Franco-German war.

*List of Members who joined between April 26th and
July 26th 1893.*

Rank.	Name.	Corps.
<i>Life Members.</i>		
Br.-Genl., c. B.	Gatacre, J.	Commanding Nagpur Dist.
Lieut.-Colonel, G.C.I.E.	Kuch Behar, H. H. Ma- haraja Sir Nripendra Narayan Bahadur of...	6th Bengal Cavalry.
Captain ...	Manifold, J. E.	R. A.
<i>Ordinary Members.</i>		
Major ...	Bewicke, H. B. N.	Manchester Regiment.
Lieutenant ...	Bright, R. A.	R. A.
Major, D.S.O.	Browne, A. G. F.	39th Garhwalis.
Captain ...	Burrard, W. D.	R. A.
Lieutenant ...	Campbell, W.	Gordon Highlanders.
Captain ...	Cookson, G. A.	16th Bengal Cavalry.
Major ...	Dawkins, H. S.	R. A.
Major, v.c.	Dick-Cunyngham, W. H.	2nd A. and S. Highlanders.
Captain ...	Edwards, C. G. F.	5th Punjab Cavalry.
Lieutenant ...	Gordon, W. E.	Gordon Highlanders.
Lieut.-Colonel	Hilliard, W. E.	Staff.
Lieutenant ...	Hughes, F. T. C.	Erinpura Irregular Force.
Lieutenant ...	Lathbury, H. O.	R. E.
Lieutenant ...	Liddell, J. S.	R. E.
Lieutenant ..	Lucas, F. G.	R. E.
Captain ...	Lyster, A.	2-5th Gurkhas.
Lieut.-Colonel	Masson, D. P.	1st P. V. R. C.
Lieutenant ...	Mitchell-Innes, C.	Royal Canadians.
Captain ...	Moulton-Barrett, H. P. ...	2nd A. and S. Highlanders.
Lieutenant ...	Neish, F. H.	Gordon Highlanders.
Br.-Genl., c B., A.B.C.	Nicholson, M. H.	Comdg. Deesa District.
Captain ...	Oldfield, C. G.	R. A.
Lieutenant ...	Palmer, H.	5th Punjab Cavalry.
Lieutenant ...	Playfair, A.	15th Madras Infantry.
Captain ...	Stevens, C. M.	Yorkshire Light Infantry.
Captain ...	Whittall, F. V.	Staff.
Lieutenant ...	Whyte, J. F.	4th Sikhs.
Major ...	Wright, W. B.	Midland V. R. C.



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PRIZE ESSAY, GOLD MEDAL.

BY MAJOR G. M. BULLOCK, DEVONSHIRE REGIMENT.

MOUNTAIN WARFARE AS APPLIED TO INDIA.

“EXCELSIOR.”

In entering into the consideration of Mountain Warfare, we are confronted with the initial difficulty that mountains and mountainous countries differ so largely in their characteristics, and in their inhabitants, that nearly every rule laid down would have to have large exceptions, and that tactics or transport arrangements, suitable to one district, would lead to disaster and disorganisation in another.

The mountainous country in which war has to be waged may be Afghanistan with its bleak, treeless, precipitous hills, varied by wide, gently ascending valleys; or it may be the jungly tree forests which cover the Chin and Lushai hills; or the varied mountains which are found in Kumaon or Nepal.

The nature of the country affects the whole of the warlike preparations. In some districts it is possible and necessary to have cavalry and wheeled artillery; in others the nearest approach to cavalry would be mounted infantry, and it would be madness to take any artillery other than mountain guns. In one portion of our mountain frontier carts and camels could supplement pack transport. In others they would be worse than useless.

Perhaps the easiest way to approach the question is to subdivide it into various heads, and discuss each with a full sense of the varied conditions which may affect it, according to the actual locality in which the warfare may be waged.

With this in view, we propose to subdivide the question as follows:—

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|--------------------------------|-------------------------|
| 1. Composition of the Army. | 7. Night Operations. |
| 2. Transport and Commissariat. | 8. Camps. |
| 2. Lines of Communication. | 9. Military Signalling. |
| 4. Tactics. | 10. Engineering. |
| 5. Reconnaissance. | 11. Training of Troops. |
| 6. Outpost Duties. | |

In deciding how an army for any given expedition should be

1. Composition of the army. composed, it is first necessary to ascertain, with the greatest possible accuracy, the nature of the country, and the nature of the tribes against whom the warfare is to be made.

In the most serious war we have had to wage on the mountains of the Indian frontier, we had to face the rough passes of Afghanistan, to pass dreary grassless deserts, and finally emerge in a country with broad easy valleys alternated with bleak precipitous mountains. We had to encounter a very fairly well armed enemy, who were strong in artillery and cavalry.

In this case, though the primary difficulties of the road would have suggested a resort to mountain guns, and the sparseness of vegetation to a reduction of the strength of the cavalry; yet the nature of the foe necessitated the retention both of a powerful artillery and a strong force of cavalry. The physical difficulties of nature had to be overcome by the resources of the engineer.

In a country so varied it was, and may be again, necessary, to be ready for warfare on the nearly precipitous mountains, or in the easy valleys below them. Consequently the composition of the army must be of the most varied character. To begin with artillery, to meet a possible massing of the resources of the country in some open plain as at Maiwand, we must have a full strength of field and horse artillery guns. The actual number must depend on the probabilities of war. We may have to enter the country as friends of one party and enemies of another, or we may meet a hostile combination of the whole country; or possibly there may be an enemy to encounter more serious than the country now contains. In any case a fair proportion of field guns is necessary.

But again, to meet the enemy on the steep mountain side, to pursue him into his difficult fastnesses, we must have a considerable force of mountain guns.

A battering train is not necessary, unless it were imperative to take Herat, which might be made strong against us. Twice we have laboured to bring up large guns through the passes, but never have they been used for any purpose which would not have been equally well carried out by guns of smaller calibre.

An armament, which though not artillery, is closely allied to it, and which must in the future work its way into prominence in mountain warfare, is the machine gun.

At present the machine guns that have been used have hardly fulfilled the expectations which have been entertained of them, but there is little doubt that before long the machine guns will be so far perfected, that they will give tremendous results against an enemy which depends rather on shock tactics than the development of fire, and the effects of well trained machine-gun fire on a Ghazi charge cannot fail to be astounding.

But in the composition of any army destined to operate in Afghanistan or indeed in any mountainous country, where the first and perhaps the most serious difficulty is the actual movement of troops over the almost impossible mountain paths, the

utmost attention has to be paid to the engineering department. Not only is it necessary to have numerous skilled engineer officers, but in every division there should be at least one pioneer battalion. From the first moment of the massing of troops on the frontier, the hands of the engineers are full. They have to prepare the way of the army, to smooth the road, to improve the water supply ; to provide posts for the protection of detached depots on the road, for signalling parties, for the defence of difficult passes. Rivers have to be bridged, rocks blown down, and without trained men for the work such arduous labours would be beyond the powers of the engineer officers.

Turning again to the composition of the fighting portion of the army, we have to remember the actual chances of the war. In Afghanistan, in addition to strong artillery, we must have a strong and handy force of cavalry. The Afghan cavalry is light, but numerous; and as it would be impossible to equal them in numbers, it is necessary to surpass them in strength and training. Our Native cavalry is as a rule fully equal to this task, and their smaller horses and lighter equipment make it easier to bring the force to the scene of the struggle in better condition than it would be to bring British cavalry with their larger horses and bigger men. But it would always be desirable to have a certain proportion of British cavalry to give backbone to the native cavalry.

In any other mountain warfare on our frontiers it would be difficult, if not impossible, to utilise cavalry. Native cavalry was used in Upper Burmah, but the mortality of horses was dreadful, and the cavalry were quickly replaced by mounted infantry.

In nearly any war conducted on our mountain frontier it would be necessary, and desirable, to have a considerable force of mounted infantry. In all the warfare with the mountain tribes quick movement and unexpected attacks are absolutely essential, and for this mounted infantry is eminently suited. But it is not necessary or advisable to form the corps of mounted infantry beforehand. It is a great help if the men have been trained beforehand in mounted infantry work, but the ponies of the country should be utilised. And this for two reasons:—1st, they are more adapted to the work they have to do, being used to the country ; 2ndly, getting the ponies in the country, the expense and trouble of conveying them up country and into the theatre of war, are avoided. All the gear and the clothing and equipment of the men should be taken up, and be carefully prepared beforehand, so that the corps may be formed at once, and of course if ponies are not available in sufficient numbers in the country, they must be brought from the nearest point ; but as a rule they are available. In Afghanistan the number of suitable ponies is practically unlimited. Mounted infantry was formed at the close of the last war, but was not much utilised. But in

the recent wars and operations in Burmah very free use has been made of them. The hardy ponies of the country are eminently suited to the work, the nature of the operation was such as to give free scope to their use. Even in the difficult Chin-Lushai country they have been used; but the roads and thick jungle here limited their operations.

Of the infantry, we need only note that the operations are likely to take place chiefly in cold climates, and therefore Native troops from down country are not suitable. A considerable proportion of the troops should be mountaineers, such as Gurkhas or Garhwalis; while attention must be paid to the class composition of the corps employed, and it should be remembered that, as far as possible, Native troops should not be employed against fellow-clansmen.

In all mountain warfare the main difficulty is transport.

2. Transport and commissariat. In order to catch the mountain levies, which appear one day and then melt away like snow, exceedingly rapid movement is required, and for rapid movement efficient transport is required: and how is it to be obtained?

In India nearly every possible kind of transport has been tried. In the early Afghan war camels, supplemented by carts, were mainly used.

In the early Gurkha wars elephants and coolies were the chief transport. It is almost incredible that elephants should have had to climb heavily loaded over the steep and rugged Kumaon hills, but the fact remains that the heavy baggage accompanying Lieutenant-Colonel Gardner's advance on Almora was all carried by elephants.

Since then, bullocks, yaks, ponies, mules, and donkeys have all had their turn.

The universal consensus of military opinion has decided that for the first line of transport in the hills mules are the most efficient and satisfactory for transport. A mule carries 160 lbs. or two maunds. He eats two seers or four lbs. of gram. So that if grain has to be carried for fodder one mule carries one day's fodder for 39 mules and himself.

It was satisfactorily proved during the march of Sir F. Roberts from Kabul to Kandahar that it was necessary to feed mules well to enable them to perform continuous hard work, and that to cut down the mule rations is the very worst policy.

From this it will be seen how important it is to push on advanced grain depots, unless it is absolutely certain that sufficient supplies of grain can be obtained in the country in which operations are to be carried on.

In this connection it should be remembered that most mountainous countries are poor, and that if they could yield sufficient

food for an army passing though once, it would be extremely unlikely that they could do it again, unless a harvest had intervened, or the stores of grain were replenished from outside.

In the case of the double march over the same ground between Kabul and Kandahar, it must be remembered that the country between Ghuzni and Kabul is very rich, and that in the case of Sir Donald Stewart's march the hidden stores were but little tapped, while during the march of Sir F. Roberts the whole resources of the country were made available by the assistance of Abdurrahman, and also that there were green crops growing, which materially assisted the commissariat by supplying excellent fodder.

If grass or hay has to be carried the problem becomes indeed difficult.

From what we have said, it will be evident that the only safe way to proceed is to push up stores as fast as possible to the most advanced depots. From these a further advance must be made, and further depots established, but only in a rich country or under exceptional circumstances, can the commissariat supply an army moving continuously and far in advance of its well-supplied depots.

As the advance is made, the roads in rear are improved, and fortified posts are built to secure the line of communication. In this way the supplementary means of transport, probably carts, or camels, can be pushed further and further into the enemy's country, thus making the task of the mules much lighter. But for the advanced portion of the force, for flying columns, for quick manœuvres, mules, or in their default ponies, will always be used.

The worst transport of any are coolies. They have to carry their own food and generally their own cooking pots; 25 seers is about the limit of their load; they suffer from disease, sulkiness, and panic, and in a word are generally expensive and inefficient.

In both the first and second Afghan wars camels were largely used, and undoubtedly will have to be used again. But the fearful mortality which ensued on both occasions has taught us many valuable lessons. It has taught us that the plains camels are of little use in the hills, and that the Brahni or hill camel should be used. It has also taught us that camels are not hardy animals, and if they get ill, take months to recover. Hence they should never be used for forced marches, they should be given ample time for grazing, and should be mainly employed for steady regular transport on the main lines of communications. We have also learnt that it is better to buy camels than hire them. The owner of hired camels readily lets his camel be stolen or die, in order to get compensation and be saved further trouble with him.

If any system of hire is employed, a contract should be made for the delivery of a certain weight of goods at a certain place in a given time, and payment made to depend on the accurate fulfilment of the contract.

The question of the actual supply of food and provisions of all sorts for the troops is too technical and departmental a question to be dealt with in a short essay.

The intelligence and political departments are responsible for keeping the commissariat informed as to the probable resources of the country in which operations will be carried on, and also for bringing the produce of the country within the reach of the commissariat.

But in any case large stores of provisions will invariably have to be pushed well forward, and until the advanced depots are well stocked, a forward movement would probably end in disaster.

The impedimenta carried by troops have now been reduced to a minimum; and the equipment tables show what in future will be allowed for troops proceeding on active service. The only point I would take exception to is the meagre provision of clothing and camp equipage for followers. It seems a question whether followers could go through a campaign without proper tentage and a good supply of warm clothing, and if followers are worth keeping at all, they are worth keeping in health.

One of the hardest and most thankless tasks in any war, and more especially in mountain warfare, is the sound and proper organisation of the lines of communication.

It involves continual work and worry; and yet there are comparatively few opportunities for reaping much distinction in it.

If the campaign is of sufficient importance, there is usually appointed an Inspector-General of the Lines of Communication. Each line is broken up into certain sections, each under a commandant; there would also be a commandant at the base and another at the advanced depot. For this line a certain number of troops would be assigned for escort duties and defence of posts along the line. The distribution of these would be decidedly the business of the Inspector-General of the Lines of Communication. The transport would as a rule be worked on the stage system if the line was permanent or semi-permanent. That is, the transport animals would work a stage loaded, and would come back unloaded next day. For this purpose animals would have to be allotted to the various posts along the line.

But in a mountain country, where the mountaineers are as a rule expert guerillas, the protection of the convoys is a matter of the greatest difficulty.

As a rule small fortified posts are established every ten miles, or closer if the circumstances of the case seem to require it. A rough sketch of a type of fortification for such a post is given later, in the portion of the essay devoted to engineering. The garrisons of these posts would vary with the necessities of the case, but these little garrisons would furnish the escorts of the convoy half-way to the next post. There they would meet the return convoy also escorted from the garrison of the next post. They would hand over each his own convoy to the other, and return to their own posts. Thus at the point furthest from the posts the escorts of the convoys would be the strongest, and when they parted they would each be approaching succour.

In many cases the garrisons of the posts would crown the heights as the convoy was approaching or departing, though in a jungly country this would not be practicable.

The garrisons of these posts would vary immensely. At the commencement of a campaign, when the whole country was disturbed, probably none would be under a strength of one company, many would be stronger; but as the country got quieter, some 10 or 12 men would suffice.

In all cases, if possible, these posts should be connected by signalling.

In considering the tactics of mountain fighting, the first fact that most strongly strikes us is the necessity of taking the initiative.

4. Tactics.

This principle holds good in all oriental fighting. To attack is generally to give yourself the chance of victory, to act on the defensive is to give the chances of victory to the enemy.

There are certain occasions when it is practically a necessity to stand on the defensive, as for instance in the defence of a convoy, or a defensive position which must be retained. But even in these cases a certain amount of offensive action is often possible, and where possible is desirable.

That purely defensive actions have been completely successful, it is impossible to deny.

In the early Afghan War Colonel Wymer twice had to fight a defensive action, and won a victory, but not complete because he was unable to pursue.

In the first instance he was protecting a convoy, and was attacked near Assiai-Ilmee by a large force of Ghilzais, and after five hours fighting repulsed them.* Again, when sent out from Kandahar to cover camels out at graze, he was attacked by 3,000 Douranee horse and repulsed them. But in each case he had artillery, and the enemy had not.

* Kaye's Afghan War, Vol. II, page 121.

The case of the defence of Sherpur may be quoted as a brilliantly successful defensive action.

But in this case a strong force of British troops was strongly entrenched, was armed with breechloaders, and possessed powerful artillery. Opposed to them were a vast, fanatical mob, full of courage and religious zeal, but indifferently led, without military skill, and urged on to the fight by the rumoured approach of a strong reinforcement before their preparations for attack were in any way complete. The result was as inevitable as it was decisive.

But though the necessities of the case, in this particular instance, rendered defensive action obligatory, the history of mountain warfare points to the fact that the offensive is the right policy of an European foe opposed to Oriental mountaineers.

I do not intend to imply that there may not be instances when circumstances require that a force, hopelessly outnumbered, must intrench itself and hold good its position until reinforced. This has occurred often. But when a force takes the field and is prepared to encounter the enemy in the open, the true tactics to adopt are to attack and not wait to be attacked.

That a judicious combination of offensive and defensive action is often possible and desirable is undoubted. The enemy as a rule, in mountainous countries, will take up a strong position on high steep ground, and be ready, if opportunity offers, to make a sudden vigorous rush down the hill. The history of the Umbeyla campaign shows that they do not always confine themselves to such tactics, but that may be taken as the key note of their mode of warfare. Under such circumstances it may be almost impossible to make a direct attack on the position, without incurring far heavier loss than an European army can usually afford in its wars against Asiatic mountaineers. Under such circumstances, it appears the soundest policy to take up a position, threatening a frontal attack, and keep the enemy occupied in front, while a strong flank attack endeavours from another direction to get on ground as high or higher than that which the enemy occupies; or at all events, take him by surprise, and threaten his rear and line of retreat.

Many instances of such enterprises have occurred, and important victories have been obtained over an enemy strongly posted, with little or no loss.

The attack on the Peiwar Kotal is an instance of frontal attack being threatened and not pushed home, while a strong flank attack worked round the enemy, and got on ground level with the enemy's main position and on his flank.

The following short account of the fight, taken from a lecture given by Captain Hoskyns R. E., gives the main points of this most successful operation :—

"On the 27th the division arrived at the base of the Peiwar Kotal. Here the enemy was found to hold a high range of pine-clad hills and precipitous cliffs impregnable in front. His position extended for about 4 miles, facing due east, and his strength was estimated at 4,000 men with 24 guns.

The division halted on the 29th and 30th of November and 1st of December. The General determined to turn this formidable position, and at nightfall on the 1st December the General, with the 72nd, 5th Gurkhas, 29th Native Infantry, and a Mountain Battery, started on this adventurous attack, supported by two Native Infantry regiments and 4 guns Royal Horse Artillery. The remainder of the division remained in camp, campfires and tents left standing, and the utmost secrecy maintained.

The force wound its way up the bed of the torrent during the livelong night. There was nothing but the stars above, and the deeply shadowed hills on either side, and the everlasting boulders at your feet; not a word was spoken, every sense was strained to the utmost, for no one knew when the fight might commence. On and on they toiled, until at last at dawn, after nearly twelve hours weary marching, our men found themselves at the foot of the lowest line of the enemy's breastworks. The ever gallant little Gurkhas, supported by the 72nd, immediately assaulted the position. They were not to be denied, and over the breastworks they poured, bayoneting the Afghans. Three lines were taken in quick succession. After three hours fighting the enemy's left was rolled up. The reserves now arrived, and a desultory fight ensued until noon, when the General with another turning movement worked round the enemy's line of retreat.

In the meantime the regiments left in camp worked up the front slopes, and this attack, together with the fact that their line of retreat was threatened, so disheartened the enemy, that they retreated in haste, abandoning their guns and tent equipage."*

It will be noted in this battle, first, the element of surprise. Every precaution was taken to deceive the enemy, the movement was undertaken by night, and the attacking force was successfully placed at dawn on a level with the foe. Meanwhile the enemy were prevented from turning all their attention to the flank attack by the advance of troops in front.

Again, when the flank of the enemy was rolled up, a further demonstration was made against his line of retreat, which eventually dislodged him.

To turn to another instance of similar tactics which terminated successfully. I refer to the battle of Kandahar on September 1st 1880.

* Journal of R. U. S. I. 1882, page 433.

Here a steep impracticable hill was strongly occupied, but it was not the only point of resistance. The southern face and under-features of the Baba Wali hill were also occupied, "and it became at once evident that a direct attack on the centre of Ayub's

* Official account, P. 76. position must be attended with great loss. Sir F. Roberts decided on a turning movement by the enemy's right."

In this instance the enemy was flushed with success. Not only had Ayub obtained a decisive victory at Maiwand, but he imagined that the retirement of the reconnaissance on the 31st August meant that he had gained another victory. He accordingly determined on an offensive movement against the British force. This was met by a vigorous counter-offensive, which drove by the enemy's right and struck home at his line of communications and retreat. Meanwhile the artillery and the Kandahar garrison threatened the front of his position, and after a considerable resistance, the enemy was not only driven back but utterly dispersed.

The casualties in this fight on the British side were only 35 killed and 213 wounded, and that although a great portion of the early fight was carried on in intricate, difficult ground, where the enemy had excellent positions and cover.

Another more recent instance of a similar character was the decisive victory gained by Brgd.-General T. Graham in Sikkim over the Thibetans. During the period of the heavy rains the Thibetans had advanced and occupied the Jelap and Pemberingo passes, and had even advanced into the Kupup valley lying at the foot of the passes on the Sikkim side. General Graham had waited for the breaking up of the rains to expel them from the invaded territory.

On the 23rd September 1888 the Thibetans had advanced and occupied the Tukola range, and it could be seen from Fort Gnathong, that they had occupied the whole range of hills from the Tukola Peak on the west, past Mount Paul, to the trigonometrical point on the east, and had also placed an advanced post on an isolated hill in the Upper Gnathong Valley. The greater part of this position, nearly 3 miles long, was strengthened by a stone wall three or four feet high. This position was occupied by some 8,000 Thibetans with about 20 jinjals and small cannon. General Graham determined to assume the offensive. Before starting the men had their breakfasts, and a day's cooked rations in their havresacks; while their kits and two days rations were packed on mules, ready to be sent after the regiments in view of an advance after the battle.

The troops were divided into three columns. The right and centre columns were weak, and intended to pin the Thibetans to their defences.

The right column, 3 companies and 2 guns, was directed to the saddleback N. E. of Woodcock Hill, to hold a position there, meet any forward movement of the enemy, and deceive him as to the real point of attack.

The centre column, 3 companies of 32nd Pioneers, proceeded up the main Tukola road to keep level with left column and act as a right flank guard to it. The left column was the real attack. It consisted of 6 companies of Gurkhas, 3 companies of the Derbyshire Regiment, and 4 guns R. A., and proceeded under the personal command of General Graham up the south side of the ridge leading to the Tukola Peak, which was the key to the enemy's position, as from it the remainder of his line of defence could be enfiladed.

The right column quickly drove the enemy from the walls opposite to them. The centre column also pushed on to about 300 yards from the Tukola Pass. By 10 A.M., the left column, advancing through mist, had reached a peak 800 yards from the Tukola, and taking advantage of a transient glimpse of the enemy's position fired a few rounds on it. At 10-30 the advanced guard of the Gurkhas joined hands with Lieutenant Holland, who had been detached from the centre column to seize a hill on the left, and from thence poured a heavy fire on the enemy's line of walls. The enemy replied, but with little effect. Ten minutes later the left column stormed the Tukola Peak, while the centre column simultaneously advanced on the pass itself.

The Thibetans waited till the troops were within 50 yards, and then fled. The remainder of the Thibetans, seeing their right turned, also fled, fired on by the guns, and pursued by the infantry. After the battle an advance was at once made, and the enemy kept on the run.*

Now in this skilful little action we see, first, preparations made to keep the enemy engaged in front, and checked from an advance, while the attack on his right, working well away to the left of the attacking force, was being developed; 2ndly, we see preparations made to take immediate advantage of the victory by a vigorous pursuit. The result shows the soundness of the plan. 8,000 Thibetans were dislodged from a strong position with a loss of 500 men, while our loss was one officer and three men wounded.

It would be desirable to turn to instances of failure, and try to analyse them, and see to what causes the failure might be attributed. One naturally turns to Maiwand. But this was a fight which showed none of the specialities of mountain warfare. Though the enemy were mainly mountaineers, yet the fight was carried out in a plain, and the only deduction, that will serve our

* Gazette of India, November 3rd 1885, para. 889.

purpose, which we can draw from the fight, is that it gives another instance of the necessity of strong offensive action against an Asiatic enemy.

We must turn rather to the events of 1840, and compare the operations round Kabul with those at Jellalabad.

Round Kabul, as soon as the first outbreak took place, which appears rather to have been a personal ebullition of animosity against Sir Alexander Burnes than an extensive conspiracy against the English, there appears to be little doubt that the Afghans were rather astonished at their own temerity, and were daily expecting punishment; and it was only when they found no action was taken that they took heart, and really organised a determined attack on the British power. Afterwards, every attack made by the British was half-hearted, was not pushed home, and ended in retirement.

The retreat from Kabul was a terrible object lesson of the impossibility of successfully retiring in face of an unbeaten Asiatic enemy. The only possibility of a successful retreat would have been to attack and defeat the combination of tribes round Kabul, and then attempt the retirement.

That this was possible, there is no doubt but whether it could have been successfully carried out by any of the leaders who were at the time in Kabul, is open to question.

Every attack made, every move begun, was upset by the divided counsels of the leaders; and it is not to be wondered at that the troops were dispirited and expected to be beaten.

The final attempt to retire before an unbeaten enemy, through a difficult and mountainous country, was a crowning and unpardonable error.

Every circumstance of the retreat was such as to give the enemy confidence, and to depress the British forces.

The road, at the best at the times, was rugged and difficult, but at the time of retreat was covered with snow and was well nigh impassable. The march of troops alone and their baggage would have been difficult, but now the difficulties were increased a thousandfold by the crowds of ill-equipped, ill-clothed, panic-stricken camp followers and hangers on. Transport at any time would have been difficult: now the British had none except what the victorious enemy chose to afford them. The question of food, even with prepared depots of supplies, was a serious one: now they could only depend on the promises of a treacherous foe. The result was inevitable, and painful as the contemplation of this chapter of our humiliation is, it teaches us in every line the mistakes which it is our duty to avoid.

Let us turn to Jellalabad. There, there was a weak, but undefeated army. Without pretending to decide the relative claims of the officers concerned in forcing on the final decision, yet this we know, that the final decision was to attack. But even in this attack, we should note how nearly the battle miscarried owing to the delay caused by one column being diverted from the main object, which was the field army of Akbar Khan, to the attack of a comparatively insignificant fort. This caused a pause in the forward and direct movement, which for a time checked the onward rush of the victorious troops, caused an appearance of rebuff, encouraged the enemy, and disheartened the attack. Luckily the obstacle yielded in time to prevent any serious dislocation of the various columns of the attack: and the original scheme of assault was carried out. The enemy in this case had the divided counsels, they found the foe whom they supposed they held in the palm of their hand, was fearlessly charging home on them. They had no plan of battle, and yielded to the shock.

It may be safely said, that a clear, well-determined plan, boldly carried out, even if it is a bad one, is better than no plan or a plan with too many alternatives.

The same principle of bold assault with careful turning movements has been equally successful in the jungle warfare in Burmah. There constantly our troops have been opposed by an enemy, strongly posted behind skilfully erected stockades. In some instances breaches have been effected in these stockades by artillery, and the enemy have given way to the determined attack of our troops; more often they have lost heart, and deserted their stockades owing to manœuvres against their flank and rear.

Attempts have been made to propose a normal formation of attack for mountain and jungle warfare. But an examination of such normal formations at once suggests so many exceptions and variations, that one is forced to the idea that no normal formation is possible, and that each attack must be made with a careful examination of the particular circumstances of the case, and that the outside that can be done is to lay down general principles. In the first place it should be a point of manœuvre to place your troops as far as possible on a level with the enemy, before exposing them to direct attack. If that is not possible, it is desirable to have broken ground between you and the foe, to break the mob of fanatically brave opponents. Meanwhile, in all cases it is most advantageous, where possible, to effect a surprise in the attack, and to manœuvre to a flank or to the rear of the enemy's position, without allowing the flank attack to be too weak to meet a serious attack on it.

In warfare in thick jungly country the essence of the enemy's tactics generally consists in ambuscade and surprise, and it is

most desirable to meet him with his own tactics. To lay ambuscades for him, and teach him that two can play at one game.*

It is well now to turn to one of the most difficult problems in connection with mountain warfare, that is, the conduct of marches.

The march into a cramped, difficult country, every nullah, every clump of trees, every cluster of rocks of which may hold an enemy, taxes the skill and endurance of any troops.

With a view to secure the march of a column, especially when accompanied by a long baggage train, it is necessary to crown the neighbouring heights. And to carry out this operation successfully taxes the skill of any troops.

The difficulty of the operation at once shows itself if the circumstances of the case are considered. In mountainous countries the roads usually lie either along a watercourse or at all events in the low-lying valleys. These are often commanded by high hills, either bare and precipitous, or closely wooded. To march along the valley without searching and holding these high mountain sides is to expose the columns to sudden, and it may be, disastrous attacks. To send weak, unsupported detachments up these mountain sides is to expose them to defeat in detail.

Let us examine instances which have occurred, and see how the problem has been solved before now by able commanders.

One of the best instances was during the advance of General Pollock's relieving column on Jellalabad. At that time the Khyber tribes were in a state of violent enmity against the English. The attempts to relieve Ali Musjid had all ended in disaster, and our Sikh allies had begun to show that they considered our chance of forcing the Khyber meagre in the extreme.

The task before the General was one of peculiar difficulty. Not only had he to carry his own stores and ammunition, but also those for the garrison of Jellalabad.

He disposed his force as follows :—

Advanced guard. 1 company 9th Foot, 1 company 26th N. I., 3 companies 30th N. I., 2 companies 33rd N. I. Following these were Sappers and Miners and 9 guns, and two squadrons of 3rd Dragoons.

Then came camels with treasure and ammunition ; then 1 squadron Native Cavalry followed by the commissariat stores, 2 companies 53rd N. I., and one squadron of Native Cavalry. Next came the baggage and camp followers ; a Risalah of Irregular Horse, a squadron 1st Native Cavalry, ammunition, litters, and camel panniers.

This was successfully tried in the Naga country by the establishment of "Naga posts," and has again been resorted to with success by Brigadier-General Palmer in Chin-Lushai land.

The rear guard consisted of 3 foot artillery guns, the 10th Light Cavalry, 2 Risalahs of Irregular Horse, 2 squadrons 3rd Dragoons, 2 R. H. Artillery guns, 3 companies 6th N. I., 1 company 9th Foot.

So it will be seen that the whole column proceeding along the actual road at the bottom of the pass consisted of an advanced and rear guard and the baggage in between.

Meanwhile, on either side there were as crowning columns:—
 Right Crowning Column—2 companies 9th Foot, 4 companies 26th N. I., 400 jizailchees, 7 companies 30th N. I., 3 companies 60th N. I., 4 companies 64th N. I., Sappers, 1½ companies 9th Foot.
 Left Crowning Column—2 companies 9th Foot, 4 companies 26th N. I., 200 jizailchees, 7 companies 53rd N. I., 3 companies 60th N. I., 4½ companies 64th N. I., 1½ companies 9th Foot, and some native auxiliaries.

Flanking parties advanced in successive detachments of 2 companies at intervals of 500 yards. Crowning columns advanced first, and the centre column did not attempt to move forward until
 *Kaye's Afghan War, the flankers had fought their way to the rear
 Vol. III, P. 86. of the mouth of the pass*.

Now is to be noted in this operation, the extreme strength of the crowning columns. The numbers on the heights were sufficient to cope with very serious attack, and yet in order to cover a wide extent of ground, they were split up into small detachments separated at full supporting distance. Thus, though the columns were long drawn out, they were not weak.

The whole fighting force was here constituted into a covering party of a large convoy, and were not therefore in a formation to encounter a serious attack.

It was known with tolerable certainty that no large body of troops was likely to be encountered, and consequently the formation was adopted, which was calculated to repel small local attacks of predatory tribesmen.

The formation was one admirably suited to meet the particular circumstances of the case, but cannot in any way be taken as a normal formation for any force passing through a mountainous country.

As a rule it may be assumed an army advancing must be ready to encounter a strong hostile force, and must be ready to fight a battle. In this case the crowning detachments cannot be so strong as was the case in General Pollock's advance. They must take more the form of reconnoitring parties, must be pushed well ahead of the main column to feel for the enemy and not fight him, and must be, if possible, in constant signalling communication with the main body. That such a duty is both arduous and dangerous cannot be denied. There are limits to human

endurance, and men must be trained mountaineers to scale the high mountains and keep up ahead of the column below, without seriously retarding the advance of the column.

It wants prudence, skill, and confidence on the part of a commander to know how strong his flanking parties should be, and when he can dispense with them altogether. With the far-ranging rifles of the present day, a party on one side of a valley can well search out the gullies and rocks on the other, and so one, instead of two, flanking parties, will suffice. Again, the arms of the mountaineers are as a rule of a short range, and when the slopes of the mountains trend gently away from the valley, their ambuscades would be too far away from the column to do it any damage. In such a case a confident commander would save his men the fatigue of the flanking work. It must be remembered that to-day the advantage in point of range is ours. In 1840 the Afghan jizail had a much longer range than the European musket.

Another difficulty which happens in the advance of flanking parties is, that the party will sometimes meet an absolutely impassable *khud* or ravine. In that case, a detachment from the main party below should be ready to ascend the hill on the far side of the ravine and take up the flanking duty, while the original flanking party descends the bill to rejoin the main body.

To carry out the same system of flanking parties in a densely wooded, mountainous country is difficult, and I would quote the opinion and practice of Colonel Gawler. It should be noted, however, that his system was not actually tested by attacks made on it.

"In a mountainous, densely wooded, or difficult country it will often happen that the route lies through a pass, ravine, or forest, where it is impossible to crown the heights, or to use flank patrols, for which there is neither the time or the force to spare. The best method of procedure there is, without checking the advance, to drop one or two files from the head of the column (at suitable distances in mere jungle, or in other cases at well-selected points as they are reached), to watch the heights, jungle, or other places likely to favour an enemy. The column or convoy then moves forward under the constant protection of well-posted sentries. Sections may be dropped at suitable distances or places as supports. When the tail of the column has passed about 200 yards, the files which have been dropped follow in succession, gradually rejoining the column by sections or companies. A regiment or brigade may thus move any distance by jungle paths or among rocks by constant inversion in perfect safety."

A somewhat similar system has been in vogue in Chin-Lushai and Burmah. Here narrow ridges are traversed, occasionally

crossed by spurs, and small parties from the head of the column have been pushed on to seize likely and commanding spots, and the column brought forward under their cover, and the advanced parties again pushed on to the next commanding spot.

A contrast between the system of crowning the heights and neglecting the function was furnished in the retirement of Pollock's army from Afghanistan in 1841. He with the troops he had taken up invariably crowned the heights, and suffered no

* *Kaye's Afghan War*, molestation. Nott and McCaskill neglected Vol. III, page 391. the precaution, and both suffered from attacks

in consequence and lost much baggage.*

In limited defiles mounted infantry might be used with much advantage. By pushing mounted infantry rapidly through a defile before the advance was expected, they might seize the far end of it, and prevent an enemy obtaining advantageous positions in it; and under their cover the advance of the column might be safely made.

A subject closely connected with the last is reconnaissance.

5. Reconnaissance.

To carry out this duty satisfactorily is immensely difficult. It implies the detachment of small parties at long distances from the main body and entirely unsupported by it.

In all our frontier countries a certain amount of information must be expected from the political authorities and from spies, but this information is often inaccurate and not sufficiently definite for military purposes.

Consequently actual military reconnaissances must be carried out. In countries where cavalry can be utilised this duty can be to a certain degree carried out either by cavalry or mounted infantry, but even then it is difficult and dangerous; and in most cramped countries any satisfactory reconnaissance is almost impossible, and must be confined almost to the operations of the advanced guard and flankers, or to reconnaissances in force. It would be a dangerous frittering away of forces to send out small reconnoitring parties, which would be liable to be cut off, and would be too weak to really ascertain much information of importance in face of strong forces of the enemy.

A good example of a reconnaissance in force of an army in position was that carried out on the 31st August 1880 before Kandahar. This was merely a feint of attack, and was entirely successful in making the enemy show all his dispositions, without getting our troops seriously engaged. But this kind of reconnaissance is comparatively easy compared with a reconnaissance which has for its object to find the enemy, in difficult defiles, and in a cramped country. A reconnoitring party then runs great danger of falling into an ambushade, of being cut off from its retreat, or of being too weak to obtain any useful information.

Another great difficulty in all savage warfare and especially in mountain or bush warfare, is outpost duty. To quote Colonel Gawler, "For the protection of camps the curtain or semicircular screen of sentries is insufficient in dealing with an uncivilized enemy. First, because our camps are comparatively very small and more easily turned. Secondly, the enemy has no tactical rear. A cordon of sentries completely encircling the camp is absolutely necessary. Against such foes, however, though redoubled precision, subtlety, and vigilance are necessary, the arrangements happily need not be of so formidable a character, and an occasional counter-plot or judicious ambuscade will do more to secure the repose and safety of the camp than doubling all the outposts."* This really puts the case in a nutshell. To form a really secure outpost line for a small force is practically impossible, and it is lucky that as a rule most of the mountain tribes seem chary of making serious attacks at night, and confine themselves to small enterprises or "sniping" into camp.

In the earlier Afghan War the piquets and sentries used to protect themselves with sungars, and doubtless this is a protection from the small night attacks. A limited number of sentries in very important posts, strong piquets in small earthworks or sungars, and a good system of patrolling ground already carefully examined by daylight, appear the true principle of outposts in the hills at night. The outposts by day require but little remark. They are comparatively easy in open mountain country, and in close jungly country must take rather the nature of detached positions round the camp than of regular outposts.

It would appear at first sight that night operations in mountainous countries are about the last thing which would be advantageous or desirable: everything would appear to be against them. A night operation in the plains is exceedingly liable to miscarry owing to the darkness and the difficulty of maintaining connection between columns or of conveying orders. As a rule Natives, living much more in the open air at night than we do, are much more accustomed to the noises and sights of the night. An European, but little used to be outside at night, or if he is, assisting his sight by artificial light, gets puzzled by the proportions of things at night. A small boulder appears a large rock, a mild ascent becomes a steep one, and he loses his landmarks and his way. Whereas Natives live much in the open air at night, they are accustomed to travel in carts or on foot at night, and can usually find their way at night as easily as by day. It would appear then, that the advantage would be all with mountaineers in

y night operation in the hills. Europeans would place themselves in a dangerous position if attacked, and would lose all the superiority of their fire.

But experience has shown that these assumptions are fallacious. Though there have been few night attacks, yet movements of an important nature have been made with signal success at night. We have already noticed one most important movement at night over a rocky mountain bed, viz., the advance over the Peiwar Kotal.

Colonel Gawler in Sikkim made a night march on Sandoopchi, and thus alludes to it :—

“Night marches, which are of immense value when well performed, require the greatest patience and attention in their execution. On a wagon road matters are tolerably easy, but when it comes to footpaths over rough ground or through bush when it is pitch dark in addition, it is trying in the extreme.

There should be a first rate officer in rear, and the head of the column should halt as a rule every 10 minutes or quarter of an hour according to the ground, to allow the rear to close up.

A mile an hour is the utmost that should be counted on by footpaths. In the night march to Sandoopchi we were very successful. The path for the first four miles might be termed dreadful, even by daylight. I knew that there was no precipice

* Colonel Gawler's or place where a man could injure himself.”* Sikkim, page 45.

Now in this latter point Colonel Gawler was lucky, as in most mountain paths there are precipices and places where you can easily kill yourself. He does not describe the nature of the path; but as a rule a path should be chosen up the bed of a nullah, as was done at the Peiwar Kotal, rather than up a spur which would be more easily chosen in the daylight.

Another striking instance of the advantage of a night march, though subsequent events nullified the advantage, occurred just previously to the advance of General Pollock's relieving army. I quote Captain Greenwood's narrative* :—

“Previously to Colonel Wyld's unsuccessful attempt at forcing the Khyber Pass Colonel Mosely was sent forward with two native regiments to possess himself of this post (Ali Musjid). The gallant Colonel made a sudden night march, and succeeded in his part of the enterprise without loss.”

Subsequently Wyld attempted to follow by day, was repulsed, and so Colonel Mosely was caught in a trap.

A very striking instance of the advantage of a night movement occurred in Ochterlony's advance on Katmandu in 1816. “All the frequented passes of the first range of hills, called Chiniaghatti, facing the Terai, were deemed impregnable. A passage

was at last discovered by which these posts could be turned, which the Gurkhas considering impracticable had entirely neglected. On February the 14th the 3rd Brigade left its ground at 9 p.m., the general officer commanding marching on foot at the head of the line. When about a mile from Bichiakoh it entered by single files a deep and narrow ravine called Balakola. Through five miles of this passage 3,000 men moved with the silence of a funeral procession.

The only sounds which interrupted the stillness were caused by the axes in removing some trees which had grown or fallen across the way. By 3 a.m. the troops ascending from hence, proceeded over ground of various character, and finally entered a nameless watercourse, which led them to the bottom of a steep acclivity at least 300 ft. high. The advanced guard, climbing up with the assistance of the bushes, occupied the surrounding eminences, and the Brigade following took possession of the Chiriaghatti heights about 7 a.m.* This movement caused a general retreat of the Gurkhas to Mukwanpur, and opened all the passes.

* Hunter's Mil: Sketches of the Gurkha War, 1814-15-16.

Another useful night movement may be recorded in the Umbeyla Campaign, when General Chamberlain resolved to abandon the Gooroo mountain, and concentrate on the slope of the Mahaban. The movement was carried out during the night of November 17th 1863.

"The vigilance of the enemy had failed them for once,

† Adye's Sitana, P. 62. and when daylight broke on the 18th, the Eagle's Nest and all the pickets on the Gooroo

Mountain were silent and empty."†

All these instances show that night movements have been most usefully employed. In none of these were night attacks contemplated, nor was there any fighting, and it is a question whether it is advisable to sacrifice the advantage of superior fire, which accrues to civilised troops by day, for the doubtful advantage of securing a surprise by night in a definite attack. Attacks by night are a difficult operation, and the slightest mistake may make them miscarry. But there is no question that night movements are not only possible, but desirable, and particular attention should be paid to them. The road to be traversed should, if possible, be reconnoitred, and a trustworthy guide procured. Pioneers should be at the head of the column to clear away unforeseen obstacles, and the utmost care taken to secure the cohesion of the different parts of the column; and ample time must be given for the movement.

Night movements in the hills should be practised in peace time. Any one who has tried to move about in the hills by well-defined roads in the dark, knows the difficulty of it, and to move large bodies by night requires both skill and practice.

Great care has to be taken for the selection of camps. Before selecting a camp the ground on all sides should be carefully reconnoitred, as before now it has happened, that after pitching a camp, the enemy have opened fire at short range on it, and the camp has had to be withdrawn.

The ground selected should be such as to give a clear view all round, and should not be intersected with ravines. In the official account of the Anglo-Afghan war of 1879-80, we find, "General Barter now represented that his camp was not well situated on account of there being numerous ravines close about, under cover of which an enemy might advance unperceived.*"

Another difficulty sometimes is the water supply. The camp is often necessarily pitched on the slope of a hill, which may be immediately over the main water supply. In this case strict regulations are necessary to secure the water for drinking purposes being drawn above the camp, the water for washing and for animals below it.

If possible there should be no heights above it on which an enemy might collect unperceived, and attack the camp. If the far sides of the camp can be so placed as to rest on an insurmountable obstacle such as a precipice or river, so much the better, as it reduces the outpost line.

As regards the sanitary aspects of a camp, the following summary of favourable sites is given by Dr. Duncan†:—

"The following sites are to be avoided when possible, (1) Valleys so narrow that the air stagnates, (2) Entrances to gorges, (3) Foot of hills, especially when the water descending from them has stagnated, (4) Depressions in a general plain with stagnating water, (5) Embouchures of rivers, (6) Half-dried beds of rivers, (7) Jungly ground on banks of rivers and lakes, (8) Ground immediately above marshes, (9) Ground exposed to winds blowing over a neighbouring marsh, (10) Dry beds of tanks, ground below the bed of a tank, (11) Forest clearings. On the contrary, the following constitute good sites, (1) All high and dry grounds, especially where there is a natural slope descending so as to carry off moisture, (2) Tongues of land jutting into the sea, (3) Slopes of hills, (4) Banks of running rivers not in the neighbourhood of marshes, (5) Grassy country, (6) Under trees, (7) Ravines through which a healthy breeze from a mountain chain above blows constantly.

As regards the geological structure, sites on granite, slate, limestone, and chalk unmixed with clay are good.

Should, however, marshes be present on the limestone, such a soil is to be avoided. Permeable sandstones are exceedingly

* Official account Anglo-Afghan war 1879-80, page 80.

† The prevention of disease in tropical and sub-tropical campaigns, P. 55.

healthy also. The following should be avoided :—Disintegrated granite, sands mixed with clay or with clay subjacent, sands incrustated with vegetable débris, clay soils, alluvial soils, especially where such soils are composed of sand and clay matter, such as are found in the deltas of rivers and their neighbourhood.

One of the most useful adjuncts to military efficiency in

9. Military signalling.

mountain warfare is military signalling. This first came prominently into use during the last Afghan War. Great strides have been made in increasing the efficiency of signallers since then. But in that war constant instances occurred which show the value of signalling. Constant communication was maintained on the long lines of communica-

* R. U. S. I. Journal tion through the Khyber and the Kuram, 1880, P. 240.

when telegraphic communication was being daily cut. Communication was kept up between the Sherpur Garrison in December 1879 and the post at Luttahand, the connecting link with their supports.*

“But perhaps one of the most prominent services rendered as yet by the heliograph, was during Captain Straton’s visit to Jellalabad in January last (1880). On the 12th of that month, when at the signal station of Aliboghan, he found out that the Momunds had crossed the Cabul River. This intelligence he at once flashed off to Jellalabad, and that night a brigade started to intercept the enemy. During the following day communication was successfully maintained between General Bright’s head-quarters at Jellalabad, the brigade sent out, and a detachment of it crowning the heights. At 1-15 p.m. (13th) Captain Straton saw about 1,500 men trying to cross the river, at such a point that if they had succeeded the brigade would have been cut off from Jellalabad, and the detachment severed from its main body. But intimation was at once signalled to all concerned, and by 3 p.m., a couple of guns sent out from Jallalabad were shelling the enemy with such good effect that they beat a hasty retreat †

These are only isolated instances of the use of the heliograph, but army signalling comes in usefully in nearly every operation in the hills. In mountain countries, where a short way across is a long way round, signalling saves an immense amount of running or riding about with messages. In keeping up communication between flanking parties and the main column, between advanced guards and their reserves, between detached posts, army signalling is invaluable. It is in some instances very dangerous, as signalling parties have often to be isolated on lonely peaks far from support. If these peaks are likely to form permanent signalling posts, it is desirable to fortify them for the

† R. U. S. I. Journal 1880, P. 242.

protection of the signalling party. A rough sketch is given at the end of this paper of what would be a suitable stronghold for some ten or twelve signallers.

It consists of a small oblong fort, which may be divided if necessary into two rooms, if there are British and Native signallers, with a staircase leading thorough a trap door to allow the signallers on to the roof. The walls would be loopholed all round, and the loopholes at least 7 feet from the ground. The door should be protected by a small ditch, which would prevent an enemy getting at it at night, and which could easily be crossed when necessary by a gangway kept in the fort.

The training and proper equipment of signallers should receive the greatest care in peace time.

Inaccurate signalling is worse than useless, as it may lead to serious mischances. Native signallers can be taught to send and read signalling with considerable accuracy : but repeated trial shows that they should have at least one English signaller with them at every terminal or transmitting station.

The tactical use of signalling has not yet perhaps received as much attention as it should. But the main difficulty is that in the plains the ground is not adapted to its extended use. Further, field days in peace time are so soon over that there is generally little opportunity to show the true value of signalling. In the hills often valuable use can be made of it in transmitting orders between distant stations, and such practice is of great value in teaching men accuracy and keeping them constantly up to the mark.

Flag-signalling requires constant practice to keep the muscles in order. Rapid and continuous signalling is very tiring, and requires considerable training.

A great deal of arrangement is necessary for the correct and punctual delivery of messages ; and permanent orderlies should be attached to all terminal stations for this purpose. This is a point often neglected, and signallers cannot be expected to deliver their own messages.

Closely allied to signalling is the field telegraph, and it has

* Up to October 1879 on the Khyber line, in 108 miles of line, 60 miles were cut off and carried away.

R.U.S.I. Journal, 1880, P. 240.

in all our expeditions been of immense value, but the difficulty is that tribesmen continually cut and carry off the line,* which makes it an uncertain means of communication. It requires considerable transport, and is more suitable to stable lines of communication than the advanced posts.

communication than the advanced posts.

As we have said earlier, the engineers are one of the most important portions of a field army in the hills. To take a resumé of engineer work

done in the Afghan War, from Captain Hoskyn's lecture :—*

"A magnificent road was engineered between Cabul and Peshawar, 200 miles in length, over a mountainous and wild country, where labour was most difficult to procure. A road was engineered between the Shutur Gardan and Thull, 100 miles, through mountainous country. A road was made through the Bolan Pass, 80 miles. A road was made over the Kojach Pass, 20 miles. In all, some 400 miles of road, or as far as from London to Edinburgh, round and over mountains to which our Helvellyn is but a pigmy.

The railway to Dadar from Sukkur, 123 miles, was laid. Some forty posts on different lines of communication, with their endless barracks, sheds, storeyards, &c., were built. Various trestle and pile bridges were built, and hundreds of miles of telegraph were laid.

Cantonments at Candahar, Cabul, Quetta, and other minor places were completed.

An elaborate system of defence of the Cabul basin was carried out.

Lastly, but not least, the Commanding Royal Engineer naturally became the prominent man in the siege of Kandahar."

This is a long and important list of works carried out by the engineers, and though many of the works relate rather to what was practically for the time being an army of occupation, yet in any mountain campaign a great many of these duties fall heavily on the engineers.

To begin with, the improvement of the roads, the bridging of rivers, and blasting of rocks must necessarily be carried out by the engineer department.

The field fortifications which they may be called on to prepare are of a most varied nature.

If the lines of communication are likely to be of a somewhat permanent character, they may have to build more or less permanent posts for their protection. A rough sketch is given of what would be suitable for a small fort for the protection of commissariat animals and supplies in a rocky precipitous country.

But in many jungly countries it is well to take a hint from the natives, and we have constantly utilised stockades for the defence of small posts.

The following description of the operations of the enemy is taken from Hunter's account* of the Gurkha war of 1814-15-16.

* Page 8.

"One party take their kookeries to cut down timber of the requisite size, and another commence operations, in line on the front, with shovels and pickaxes. An inner and an outer circle (oblong trapezium or whatever the form) of stakes is

* R. U. S. I. Journal 1882, page 448.

then driven into the soil, those in the same line being connected by means of smaller trees or branches woven between them; when the intermediate space is filled up with loose stones and earth. The Goorkhas will in this manner erect a strong stockade in almost as little time as an equal number of our men require to pitch their tents."

This style of defence is eminently suited to jungle warfare in the hills; it presents an obstacle, is easily and quickly made, and should be practised in the hills in peace time.

The forests in the hills could well afford enough trees to practise our men in such exercises, and as the trees most generally are utilised for firewood, the trees cut down for the stockade would be as useful after having been used for stockading as they were before.

In rocky countries earthworks are almost out of the question, and their place is taken by "sungars" or rough stone walls. These afford a certain amount of protection from fire, but there is always the danger of splinters from the stones, which do as much damage as the bullets. If possible the "sungar" should be faced with earth, or at all events bushes, to retain the splinters as much as possible.

An improved stone sungar was much used in our last Afghan war, of which the handskeetch given shows the ground plan and section.

It was used for the protection of piquets round the camp, and held from 6 to 10 men. If made of dry stone work, and served its purpose admirably.

Sufficient attention is not paid to training troops for mountain campaigning. A large portion of the
 12. Training of Troops. British troops in India are moved every hot weather to the hills; but it is feared sufficient care is not taken to reap the full advantage which might accrue from this move.

Troops in the hills should be carefully trained in working up and down the khuds, and got into hard condition for hill climbing. By a steady and progressive course of training, men should be brought to a condition of hardness, which should make the climbing of the hill sides a matter of comparatively slight effort. At first on the ordinary hill roads, and later on, on the actual hill sides, men might be taught to skirmish against skeleton enemies, or actual detachments posted to oppose them.

They should be taught the duties of escort to convoys, to crown the heights, and make long distance marches, under circumstances assimilated as far as possible to the conditions of actual warfare. Field firing should be practised in the hills, to ac-

custom men to judge distance across the khuds and to fire after a steep climb. Again, night marches in the hills should be frequently practised. We have seen how often these night movements have proved of great service in our many little hill wars, yet I doubt if any difficult night marches are practised by any of our summer garrisons in the hills. Every one knows the difficulty of them, and it is only by experience and continual practice these difficulties can be minimised. Again, though shelter trench drill is a recognised portion of military training in the plains, the formation of stockades, and stone epaulements are rarely, if ever, practised in the hills. Government, if approached, would surely sanction the requisite number of forest trees being cut down, under the supervision of forest officers, to suffice for the requirements of regiments practising the formation of stockades. In some regiments tree cutting is practised in the hills, and it would be desirable if all regiments should be encouraged to carry it on as far as possible. The practice is healthy and interesting. The forest department have continually to lop and fell trees, and it would be most desirable if these operations were carried out as a regular military exercise by the troops in the hills. The skill thus acquired would be invaluable on service.

Again, the formation of rough huts and bivouac shelters should be regularly and systematically taught. At present there is a grandmotherly care taken of all forest trees, but by a judicious exchange of views between the military and the forest departments I believe much valuable practice might be obtained by the military, while economical and unpaid labour might be given to the forest department.

Temporary bridges might be built over streams, and communications generally improved. What the British soldier suffers from most in the hills is the ennui of enforced idleness; and a few practices such as I have suggested would give an agreeable change to his monotonous life, and at the same time train him for the necessities of active warfare in the hills.

In the case of the native army there are greater difficulties in carrying out such training. With the exception of the Gurkhas and Garhwalis but few native regiments ever are quartered in the hills. Those that are, are native mountaineers, and by habit and early associations are well fitted for mountain campaigning, but even these might have more special training in stockade or sungar making. Of the others, the bulk of the Punjab regiments are mountaineers, and of the ordinary down country regiments, but few are fitted for hill fighting.

Another point of training has received considerable attention, but the results are not yet quite as satisfactory as could have been hoped for. That is training in transport duties. Classes are

now regularly formed for both officers and men in transport duties, and a certain improvement is discernible. But even now, transport animals in regimental charge appear often to deteriorate ; and if much used in hill transport, easily get rubbed, notwithstanding the training the men have in loading them. The fact seems to be, that though a considerable number of men go through a course of transport training, comparatively few have much practice afterwards, and the training, without subsequent practice, easily gets forgotten. It is certainly remarkable even in the quiet work in the hills which the mules perform in peace time, how much their backs get rubbed, and one hint gained in the Afghan War seems to be forgotten. Colonel R. Low (now Major-General Sir R. Low, K.C.B.) in his remarks on transport points out the advantage that appears to be derived from using a long strap to act as a sort of surcingle, which passes over the load and under the belly of the mule. This steadies the load and prevents it setting up a swinging motion, which shifts it and the saddle on the mule's back.

One word in conclusion. Nearly every year some portion of the army is engaged in more or less important operations in the hills. Yet of these operations there is seldom to be found a satisfactory history. The lessons learnt, the mistakes made, the steps taken to rectify these mistakes, may be recorded for the benefit of the Head-Quarters Staff, but they are not published in any form which is generally available for the army. The young soldier who wishes to study mountain warfare in India, has to be content with very few books as a rule, and those are not always obtainable, being old and often out of print. It is not a subject of instruction at garrison classes, and what is known of it is chiefly derived from experience, and from the training so many officers in India have had in many a mountain war.

But is this satisfactory ? Should not the lessons of the past be collected, and available for all to learn ?

Should not the warfare we are likely to wage be a subject of study, in preference to a warfare in which our army seems never likely to engage ?

The lines of our military education have been laid down too much by those whose eyes are dazzled by the great wars of the Continent, and who forget that the work we have to perform is equally arduous, requires as careful a study, and that the materials for that study are to be found in our own "little wars."



SIGNALLERS'

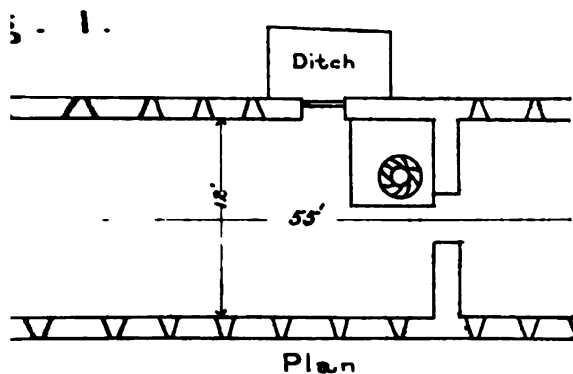
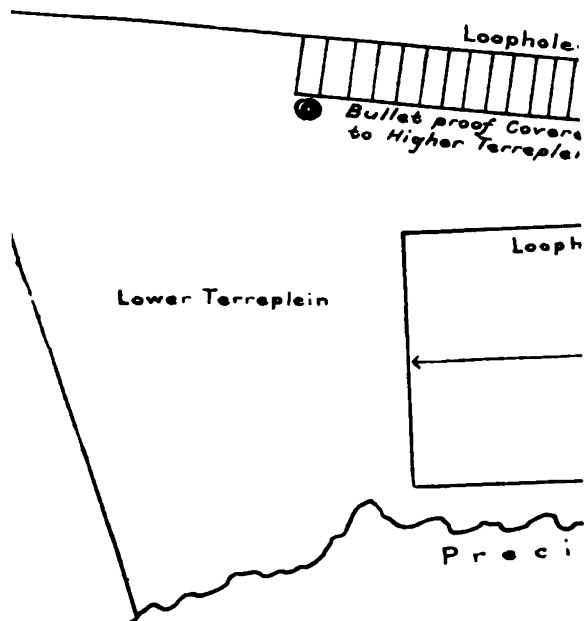


Fig. 2

COMMISSARIAT AND T





THE USE OF THE BAYONET.

BY (THE LATE) LIEUTENANT W. SETON BROWNE, 6TH P. I.

The bayonet, as a weapon of offence and defence, has been very much lost sight of in modern times ; probably in consequence of the attention now devoted, and most properly, to fire discipline and tactics ; in fact it is almost laid down as an axiom by some writers that the 'charge' state of a battle will never be reached again. There will, however, especially in a close country, be many occasions when individuals, small parties, or even regiments, will have to take to the bayonet both for offensive and defensive purposes. In a sudden Ghazi rush, or cavalry surprise, there may be time for a couple of volleys, and then each man will have to depend on himself ; that is to say on his knowledge of, and skill in using, the weapon he is armed with. The object of this article, however, is not to discuss the probabilities of the bayonet ever being required in action, but to show, as far as possible, its importance as a weapon of offence and defence ; and how very necessary it is to teach the men, who carry the weapon, how to use it.

1. Every recruit, before being passed into the ranks, is supposed to go through a course of gymnastic training. In the British service, I believe, this lasts six weeks ; in the Native army, I fancy, there is no particular period laid down. In nine cases out of ten this course is shuffled through as speedily as possible.

In most gymnasiums, there are a certain number of condemned places for attack and defence practice ; perhaps, during the course, a recruit is taught these practices after a fashion ; with what result can be easily seen, if you pit one recruit against another in 'loose play'. They exhibit absolute ignorance of how to use the weapon even in attack ; this is, of course, because they have never been taught the attack and defence practices properly, nor have they ever been practised in loose play ! The only other teaching they get is on parade, where they learn the bayonet exercise. This is invariably taught as a show parade exercise, every attention being paid to the smartness with which the men handle their weapons, and no attention at all (except in a very few regiments) to the strength with which points are given, or to the way in which the bayonet guards are formed. Everything is done with a view to smartness only, and to make the whole exercise completely useless regarding any practical instruction in the use of the bayonet, more often done in quick time than by word of command. The only part of the bayonet drill that should ever be done in

in quick time is the few practices in attack and defence ; each of these being akin to a sharp bout in loose play. When taught the bayonet exercise on parade, the recruit is invariably taught to make each guard and point a distinct motion, with exactly the same pause between each ; whereas in loose play, there is not the slightest pause between the guard and the return point, or, if there is, the point is most probably useless.

Immediately a recruit has learnt the bayonet exercise, he should be put through the attack and defence practices very carefully, every day, until he has learnt the meaning of each guard, feint, and point ; and then he should be practised in loose play daily, till he has attained a fair amount of skill in handling the weapon. This, of course, is utterly impossible in Native regiments under present conditions, as two spring bayonets per regiment, are allowed as an *annual* supply ; these are, at present, of such a pattern, that three months continual use usually renders them utterly useless.

To teach the recruit properly, you must have men, who have been carefully and properly taught themselves, as Instructors. These men would, naturally, be the gymnasts trained at Umballa or elsewhere. Three such men (Natives) recently taught have lately come under my observation. They were hurriedly instructed in bayonet play, they tell me, during the last ten days of the course ; and I find they are perfectly ignorant of the attack and defence practices, and are of course, incapable of instructing a squad of recruits in these practices. I gather from this, that it is not considered an important part of their training, as in all other respects they are most carefully taught.

Competitions at assaults of arms for Native troops often show how very superficially the men have been taught to play ; it is generally of the most 'flukey' and unpractical description ; the rifle may be held anywhere with the right hand, from the toe of the butt to the backsight, according to each man's fancy ; counter hits abound to such an extent that the judges are nearly driven wild. Many men simply wait, and point whenever the adversary points, making no attempt at attack or guard, but simply trust to luck in ultimately getting their point in first. I have never yet seen a man disqualified for doing this, though, in my opinion, he most certainly should be. In these competitions the judges are very seldom men who can play themselves, and consequently they know very little about it. Another point that 'flukey' players are very fond of, is the point at the toe ; a perfectly unpractical point, and one that lays a man completely open to a quick adversary ; no point should count below the knee. With large-handed men the favourite grip or hold is right at the end of the butt, from toe to heel ; this should most certainly be disallowed, for in actual combat no man would shift his grip from the small of the butt.

I think, in the majority of instances, competitions between bayonet and bayonet take place without any limit as to space in which a man may move about ; consequently he can run backwards as long as he likes, instead of standing up to his adversary and meeting his attack. Competitions should be fought in a ring of not more than twelve yards diameter. It is very necessary that every unpractical method of play should be eliminated from these competitions, by unsparing disqualifying on the Judges' part, whenever they observed any infringement of the rules for play, such as :—

(i). A competitor running backwards out of the ring, instead of standing up to his adversary, should lose the bout.

(ii). A competitor *palpably* making no attack or guard, but relying on a counter hit, should be warned the first time, and on repeating the offence should lose the bout.

(iii). Any competitor pointing purposely below the knee should lose one point.

&c., &c., &c.

Every trick that a man would be certain not to make use of or attempt in actual combat should be ruled as a foul, and his adversary allowed to score a hit.

It would make the bayonet instruction more thoroughly practical, if the competitions were sometimes by squads (this, I think has already been done in England,) *viz.*, a squad of ten men of one regiment pitted against a similar squad of another. These squads to be formed up in line, opposite one another, in single rank at three paces interval, and just out of distance of each other. On the word 'attack' each man would engage the man opposite to him ; as any one man puts his adversary out of action, he should be halted and stood at ease by his judge (there being a judge for each pair,) the beaten man retiring from the arena. After the first round, there might be four men left on one side, and six on the other ; these four should be formed up opposite the six at three paces interval, or closer if they preferred it, and the attack recommenced, and so on until none of one side are left. This, as described here, sounds rather unpractical ; but it is merely given as an idea for a competition which might be improved upon.

Competitions between sword (dismounted) and bayonet should be encouraged, and taught more than they are at present. In the last assault-at-arms I was present at, the winner of sword *versus* sword (dismounted) was an uncommonly good swordsman ; but when put opposite the best bayonet man, though the latter was, at best, but an average player, he did not in the least know how to engage him : this of course was because he had never practised with the sword (though a cavalry man) against a bayonet. This is not an exceptional case. The bayonet, when in the hands of an unskilled

player, can easily be beaten by the sword, if the swordsman has the faintest conception of how to go about his work; on the other hand, a good bayonet player ought never to be beaten by a swordsman on foot, if only he keeps his point low, and constantly moving from side to side, never letting the swordsman attack, but always taking the initiative himself.

The confidence which inspires a man who knows how to use the weapon he holds to good purpose, makes a skilled man worth three unskilled ones in a rough and tumble. The very fact of being able to use his weapon with effect, and knowing that he is equal to or even better than most men armed with the same or any other weapon, makes him think more of himself, smartens him up, induces him to seize every opportunity of showing his skill, and brings him to the front in a tight place, with a confidence in himself that men, unskilled and unpractised in the use of their weapons, cannot have, and which they will feel the want of under similar circumstances.

Take for example a sudden Ghazi rush. If by surprise or any other means it gets through the hail of bullets which *should* sweep it from the face of the earth, what havoc would be played with men untrained in attack and defence before the Ghazis were all wiped out. On the other hand, take a regiment, every man of which had been trained in these practices; each man, individually attacked, would guard the Ghazi's first chopping cut, and put his bayonet straight through him. Of course it may be argued that only one man in fifty would be found to thus keep his head, and use his bayonet as if merely engaged in loose play, still the fact of being accustomed to face an adversary in friendly combat, would undoubtedly be of invaluable service in an onslaught so sudden and determined as the one instanced. Skill at arms has never in our army been seriously considered—and though in recent years, as now, the matter has received more attention, still there are many who think individual knowledge of weapons inconsequent, probably because they consider close quarter fighting out of date. Looked at from a large point of view, this is probably the case, but there are bound to be occasions, and these not seldom, when men will be unable to fire, and have to fight for their lives in hand-to-hand combat with the weapons they have. In such contests it is clear, that he, who by practice in peace time has become familiar with the use of his weapon both in attack and defence, will be able to cope with a skilled adversary with every chance of success, and will destroy an unskilled one with ease and certainty.

THE DOUBLE COMPANY SYSTEM.

BY COLONEL G. F. YOUNG, 24th P. I.

Lieut.-Col. Barrow's paper in the May number of this journal contains a defence of the Double Company Organisation for Native Infantry. The reflection to which one is irresistibly drawn on laying it down is, that if that is all which can be said in favour of the system, even by so able an advocate, (and I believe it *is* all), it stands *ipso facto* condemned.

Colonel Barrow's paper wisely avoids the whole tactical side of the question, confining itself entirely to the administrative side, in which direction only are to be found any arguments in its favor, weak as I think even these are. I propose therefore to briefly examine what are the points in which the Double Company Organisation fails so seriously, and to endeavour to show that these entirely outweigh and obliterate any supposed advantages of the kind mentioned in the paper referred to.

The Double Company idea seems to have its true origin in one direction alone ; no doubt there are other reasons, such as that for instance of cheapness, which add their quota in making the system appear to some extent advantageous, but it would be unfair on its advocates to credit them, on so vital a matter as the organisation of the infantry of the army, with reasons so inadequate by themselves ; and the one true origin alone of the belief that the system is worthy of adoption would seem to be the idea (often prevalent without their being aware of it in the minds of many who look at the question cursorily,) that a method of organisation which suits cavalry may be expected to at all events fairly suit infantry likewise.* No more mischievous error could be held. The organisation of a fighting arm *must* be based, if it is to be sound, on tactics alone, and I do not suppose any of the advocates of the Double Company Organisation will venture to argue that cavalry tactics and infantry tactics are alike in principle ! Yet given two arms whose tactics are essentially dissimilar, and this fact alone is conclusive as to the false principles necessarily inherent in any organisation common to both. Unless the Squadron Organisation is false in principle for cavalry, the Double Company Organisation is *ipso facto* false in principle for infantry.

Such a method of organisation for infantry contains a dangerous fallacy, all the more dangerous because to a mere superficial inspection of the thing (which is the only one possible to those who have not drunk in from the time of their military infancy, the principles underlying all infantry fighting methods†) the fallacy is not apparent. It is, in

* Curiously enough, since the above was written, a writer in the *Pioneer*, who is not an officer of infantry, has completely corroborated my statement by using this very argument as the basis of his advocacy of the system.

† N. B. It has been said, that in artillery we deal mainly with *guns*, in cavalry with *horses*, but in infantry with *men*, and the point has a distinct bearing in this question.

fact, an admirable organisation for everything except one thing, viz., *fighting*. For general administration, for interior economy, for peace parade work, for musketry and other instruction (so far as such instruction can be separated from its ultimate object), the Double Company system is not so very far behind the Company system ; while of course cheaper, in that results quite good enough for mere peace requirements can be got for less money. Though even in these matters it is evident, that an officer who commands and trains a company of 120 men (which is the size that seems to me the best, giving as it will a battlefield strength of about 80 men), will always have very great advantages towards reaching a high standard of efficiency over one who has to command and train a double company of some 250 men. Still, for a mere peace standard it does well enough, while any one can see the financial advantage, though I think this is often overestimated. But when we come to fighting, and to tactics, if carried out under strictly fighting conditions, it is another story altogether, and there this precious system which looked so nice in peace collapses so completely, as to remind one of nothing so much as the prompt collapse of H. M. S. "Victoria" under the ram of H. M. S. "Camperdown."

Every argument against the Double Company system applies with equal force to the collateral system of four large companies instead of eight small ones ; and though their defects are not in every respect the same, it will be useful to consider them together, as it will show more clearly the way in which the Double Company system fails.

It is for reasons such as those glanced at above, that officers who belong to the artillery or cavalry branches find it almost impossible to see why the Double Company Organisation for infantry should not do well enough ; for while seeing the arguments in its favour, they cannot possibly see, or at all event appreciate, the grave defect which nullifies the whole. But troops are not maintained merely to live in barracks, and to be manœuvred on peace parades ; and on the battlefield the double company (or the large company) proves itself at once a hideous delusion, certain to be fatal in its consequences.

Now the double company must inevitably follow one of two roads :—

- (a) Either it must become (perhaps by gradual steps, but none the less surely) itself the fighting unit ; and so become nothing more than a large company under another name.
- (b) Or, it must become a dead letter in everything *but* name, as far as tactics are concerned, the companies remaining the fighting units.

It is utterly impossible that it can take up any central position between these two divergent roads. Yet either of them will involve a committal to the most glaring false principles.

For if (a) be the course followed, then the system at once falls foul of all the arguments against the large company system, with which arguments those who are conversant with the ideas of French and German officers on the subject are so familiar, and which may surely be called crushing. Put in a few words, they simply amount to this, (1),

that so large a body as 200 or 250 men *cannot* be the fighting unit of infantry in these days, and (2), that unless the fighting unit is also the unit for all other purposes, a radically false principle is introduced, which is fatal to such fighting efficiency as will, in these days of high pressure, alone win.

If, on the other hand, the other horn of the dilemma, (b), is chosen, then the case is, if possible, worse. For then we have the fighting unit led on the battlefield by a man who has not been its instructor on the training ground, or its commander in quarters, and who in both these capacities has been a mere subordinate, acting on another man's ideas. It does not require any extensive reading (though it does require a personal acquaintance with infantry) to know that the leader of the unit in battle, its instructor on the training ground, and its commander in quarters, must, for such fighting efficiency as will alone win, be one and the same man. And no more deadly false principle can be mentioned than that which would sever this relation.

Nor is this all. For in the case of *Native* infantry, both (a) and (b) are subject to yet another heavy defect, in that whichever course is followed it obliterates and crushes down the Native officer, relegating him to a yet lower rôle than he even has at present, whereas any change ought most certainly to be in exactly the opposite direction. This point has been strongly dwelt upon by a recent letter from a Commanding Officer in the "*Pioneer*," and its bad effect is so self-evident that it needs no additional arguments from me.

It cannot be too often reiterated that *no organisation, and no tactics, which on the battlefield involve the breaking of the company, can be anything but radically unsound*. By slow but sure steps we are returning in our infantry tactics to a point from which we ought never to have departed, as we did some 18 years ago; and if we wait long enough, shall most certainly see the company (in a plain line, from 25 to 40 yards long, in a single rank when weak, in a double rank when strong) the sole unit of reinforcement; there is no difficulty about it, and it is bound to come, simply because it will be recognized that nothing is so absolutely against all chance of success, or will involve such losses, as *the breaking of the company*; and that the side which first learns to keep its companies intact under all circumstances will crumple up the other with the greatest certainty, besides suffering less loss than it would in any other formation. But this can only be done with the small sized company of about 80 men (fighting strength). And if in the meantime we should, in defiance of the tendency of all modern military teaching, adopt anything approaching to the large company, we shall be forced to make a second change and to revert again to our present organisation; a sufficiently objectionable result from whatever point of view it is regarded.

The one thing which all Europe envies in our army is our small company organisation, knowing as those countries so well do the greatly superior fighting power which it gives. In the German army the "*zug*" is fast becoming, if it has not already become, the real tactical unit, and our small company differs in no way from the "*zug*" except in being better by being not only the tactical but also the ad-

ministrative unit. Therefore to abolish the company as the administrative unit (even if it were left as under (b) above, the tactical one) would be a retrograde step and a serious blow at efficiency. We ought not to require in such matters to look to Germany for instruction; the history, the knowledge, and the experience of our own army ought to be quite sufficient in such matters. But I may add that the Germans know all the above well enough, and would have our small company organisation to-morrow if they could get it; nor is it the great cost, with so huge an army as theirs, which would deter them; they value it so highly that they would manage to find the money fast enough; *but they have not got, and cannot manufacture, the officers, for such a purpose.* This is the obstacle which stands in their way. England on the other hand has no difficulty in regard to the officer class; it can find them in thousands if necessary, and we should be mad to throw away the one advantage we possess, which counterbalances our paucity of men, and to give up our tight compact little companies, which have proved their stoutness in so many a severe strain for generations, in favour of the unwieldy and theoretical double company or large company of other powers which powers, by the bye, for all their one war of now 23 years ago, have not half as large a total practical experience of fighting as we have.

The above ought to be convincing enough that the Double Company Organisation is one to be sternly avoided by us. As if, however, all this were not enough, that system, if introduced for our Native infantry only, bears this additional heavy condemnation, that it involves the effect that one half of our infantry brigade will be organised in one way and the other in another! It can at once be seen how false a principle is involved here. Anything more suicidal, in the severe strain placed on infantry in modern war, than to give ourselves such a handicap as (in addition to the disadvantages already glanced at) the having in one brigade two different systems of organisation cannot be imagined. To deliberately construct such a machine as this for work on a modern battlefield (where, do what we will, confusion must be immense, and where therefore everything which tends to increased confusion is *poison*), and to hope for success, would be to be indeed sanguine. Bad as the Double Company Organisation would be, if adopted for the whole brigade, it would be ten times worse if adopted for half of it. Cavalry officers may get some faint idea of the effect by imagining a cavalry brigade with the British portion organised in and trained to work by troops, and the native portion organised in and trained to work by squadrons; but even this gives only a faint picture of the effect in an infantry brigade.

Our object in these days should undoubtedly be just the reverse, *viz*, to avoid in every way possible all differences of armament, of equipment, and above all, of organisation, between the battalions composing a brigade; and so long as those responsible for the organisation of our British infantry battalions keep to the eight small independent companies (and long may they do so), it would be a departure from the most elementary principles of war to adopt for our Native infantry battalions any other organisation.

I

Proceedings of a meeting of the Council of the United Service Institution of India, held at Simla on May 15th 1893.

PRESENT.

His Excellency General Sir G. S. White, G. C. I. E., K. C. B., V. C.,
Commander-in-Chief in India, Presiding.

Major-General Sir E. H. H. Collen, K. C. I. E., Secretary to Government of India, Military Department.

Major-General C. E. Nairne, C. B., Commanding Meerut District.

Major-General E. Stedman, C.B., Quarter-Master-General in India.

Colonel W. L. Dalrymple, D. Q. M. G.

Colonel K. D. Murray, D. S. O., 1st A. A. G.

Colonel M. J. King-Harman, Dy. Secretary to Government of India, Military Department.

Colonel I. S. M. Hamilton, D. S. O., Military Secretary to H. E. the Commander-in-Chief.

Colonel E. R. Elles, A. Q. M. G., I. B.

Colonel G. F. Young, A. Q. M. G.

Captain F. A. Hayden, West Riding Regiment (Secretary).

I. The auditor's cash account for 1892, and the balance sheet for 1892, were passed.

II. The roll of membership (as below) was presented, and passed.

	Life	Ordinary,	Regtl.	Instn.	Total.
Joined from 1st Jan. to 31st Dec. 1892...	9	170	1	...	180
Removed ditto ditto ditto ..	5	73	6	...	84
Remaining 31st December 1892.....	64	716	26	...	860
Joined from 1st Jan. to 1st May 1893...	2	51	...	...	53
Removed ditto ditto ditto...	...	18	1	...	19

The following table shows the number of subscribing Members on the Roll during the last five years.

	Life.	Ordinary.	Regtl.	Instn.	&c.	Total.
1st July 1889.....	46	472	114	=		632
1st July 1890.....	46	509	104	=		659
1st July 1891.....	52	594	*32	=		678
1st July 1892.....	58	679	26	=		763
1st May 1893.....	66	749	25	=		840

* 76 Officers' Messes debarred from 1st January 1891, and struck off the rolls accordingly.

III. With the reference to the appointment of a Secretary for 1893-94, Captain F. A. Hayden, West Riding Regiment, was re-elected to the post until September 30th 1893, and Staff-Captain F. C. Colomb, 42nd Gurkhas, Intelligence Branch, Qr. Master General's Department, was appointed to succeed Captain Hayden.

II

IV. It was resolved that the Executive Committee for 1893-94 be composed of the following officers (who have consented to act) :—

Colonel E. R. Elles, A. Q. M. G. I. B.

Colonel M. J. King-Harman, Deputy Secretary to the Government of India, Military Department.

Colonel W. P. Symons, C.B., A. A. G., for Musketry.

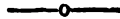
V. A vote of thanks to the outgoing Executive Committee was proposed by His Excellency the Commander-in-Chief, and carried unanimously.

VI. The following proposal by Lieutenant-Colonel H. A. Sawyer 45th Sikhs, was placed before the meeting :—

“That Officer's Messes and Book Clubs should be able to become annual subscribers to the Journal by an annual payment of Rs. 20, or life subscribers by a payment of Rs. 200.”

The proposal was discussed, and eventually negatived by a majority of four.

F. A. HAYDEN, CAPTAIN,
West Riding Regiment,
Secretary.



The following members of the Council, having served three years, retire from the Council :—

Major-General Sir E. H. H. Collen, K. C. I. B.

Major-General G. E. L. S. Sanford, C. S. I., R. E.

Colonel K. D. Murray, D. S. O.

Colonel R. G. Woodthorpe, C. B., R. E.

Major C. E. Sawyer, North Lancashire Regiment.

To fill the above vacancies, His Excellency the Commander-in-Chief in India has nominated the following officers :—

Major-General Sir E. H. H. Collen, K. C. I. B. (re-appointed).

Major-General H. F. Grant, C. B., Inspector-General of Cavalry in India.

Br. General J. Gatacre, C. B., Commanding Nagpur District.

Br. General M. H. Nicholson, A. D. C., Commanding Deesa Dist.

Colonel R. M. Jennings, D. A. G. Army Head-Quarters.

F. A. HAYDEN, CAPTAIN,
West Riding Regiment,
Secretary.

III

PRIZE ESSAY, 1892-93.

The Gold Medal for the best Prize Essay of 1892-93 has been awarded to the writer of the Essay with the Motto, "Excelsior," (Major G. M. Bullock, Devonshire Regiment).

The Essay bearing the Motto, "Scribimus indocti doctique exagia passim," (Captain F. C. Carter, Northumberland Fusiliers), was placed first by the Referees, but is disqualified from taking the Gold Medal by having transgressed condition 2 of the Prize Essay Competition, in which it is laid down that an Essay must not exceed 32 pages of the size and style of the Journal.

Essays with the following mottoes were also received :—

"Act according to circumstances.

"Ducit amor patriæ."

"Ex unâ disce omnes."

"Fides et perseverantia."

"Labor omnia vincit improbus."

"Virtuti non armis fido."

The Council beg to acknowledge the valuable services rendered by the Referees.

By order of the Council.

F. A. HAYDEN, CAPTAIN,

West Riding Regiment,

Secretary.

UNITED SERVICE INSTITUTION OF INDIA.

Cash Account for the year 1892.

Receipts.	Ra.	A. P.	Ra.	A. P.	Expenditure.	Ra.	A. P.	Rs.	A. P.
By Balance brought forward.....	...	...	1,467	13	To Secretary's Allowance.....	1,200	...	...	...
" Government grant-in-aid.....	3,000	...	...	...	" Office Establishment.....	1,183	...	...	...
" Subns. & Donations { Arrears 522-8 } { Current 3,938-8 }	4,462	...	...	...	" Office & Establishment Contingencies	44	4	...	...
" Miscellaneous receipts.....	88	11	...	...	" Office Stationery and Miscellaneous	197	...	...	...
" Interest.....	285	...	...	...	Printing.....	837	12	0	...
					Postage.....	74	4	3	...
					" Journals and Lectures.....	3,471	2	9	...
					" Rent of Premises.....	900	...	...	...
					" Furniture.....	70	4	6	...
					" Miscellaneous, viz. Auditor's fee }	86	7	5	...
					Ra. 32, Sundries Ra. 54-7-5 }				...
Amount held in 4 $\frac{1}{2}$ Govt. Paper.....	4,000	...	7,835	11	By amount held in Govt. 4 $\frac{1}{2}$ Paper.....	4,000	...	7,519	3
Fixed deposit with Alliance Bank.....	2,500	...	6,500	...	" in deposit in Alliance Bank...	2,500	...	6,500	...
					" in floating account with Al-	1,789	5	3	...
					" liance Bank.....	45	...	...	...
					" in hands of Secretary.....	...	...	1,784	5
					Balance as per pass book...Ra. 1,999-6-6	...	...	...	...
					Less unpresented cheques... " 260-1-3	...	...	...	...
					" 1,739-5-8	...	...	...	...
Total Ra. ....	...	...	15,803	8 5	Total Ra. ....	...	...	15,803	8 6

Examined and found correct.
(Sd.) THOMAS S. BEAN, Auditor.
Simla, 12th February 1893.

(Sd.) F. A. HAYDEN, Captain,
West Riding Regiment.
Secretary.

UNITED SERVICE INSTITUTION OF INDIA.

Balance Sheet for the year ending 31st December 1892.

LIABILITIES.	AMOUNT.			ASSETS.	AMOUNT.		
	Rs.	As.	P.		Rs.	As.	P.
Balance Credit	...	...	...	By Cash in hand	1,784	5	3
	8,466	7	5	" Rs. 4,000 in 4 % Government Paper value	4,160	0	0
				" Fixed Deposit in Alliance Bank,	2,500	0	0
				" Balance Credit with Messrs. Allan Wyon, 5s. @ 1-2½	4	2	2
				" Ditto with Manager Civil and Military Gazette	18	0	0
TOTAL,.....	8,466	7	5	TOTAL,.....	8,466	7	5

(Sd). F. A. HAYDEN, Captain,

West Riding Regiment,

Secretary.

The Journal
OF THE
United Service Institution of India.

VOL. XXII.

1893.

No. 108.

At Simla on August 30th 1893,

His Excellency **SIR G. S. WHITE, V.C., G.C.I.E., K.C.B.**, Commander-in-Chief
in India, in the Chair.

MODERN GUN CARRIAGES.

By **Captain C. C. TOWNSEND, R. A.**, Superintendent Gun Carriage Factory
Futtehghur.

YOUR EXCELLENCY AND GENTLEMEN :

When, at the request of the Director-General of Ordnance, I commenced to write a paper on "field, siege, and hydro-pneumatic mountings", I was confronted with one serious difficulty. The mass of material at hand seemed to forbid condensation into the limits of a paper. I was forced, then, to set aside all that did not seem likely to be, directly, or indirectly, useful to India, taking the 10" gun as the top limit, and then

Field.

to make a selection of samples from
this already reduced list. I must
ask your indulgence, therefore, for the many points of interest that I am forced to omit. On the other hand I was obliged, in order to cover the ground laid down, to touch on many points which are already well known to you. I must, therefore, ask your further indulgence for the

Plate I.

extreme simplicity of the mount-
ings selected for illustration. I will
commence with field carriages, but no absolutely rigid line of distinction is possible with existing equipments. I will take first the well known 12 pr. B. L. Mark II* carriage, partly because we are all interested in the guns that accompany an army in the field, however familiar they may be, and partly, because I think that, in considering the points of this carriage, we do not always place clearly before us the interdependence of its simple mechanism. Sometimes quite minor questions crop up for disposal which can, apparently, be solved in a minute, yet a close consideration of the apparent solution shows that a number of side issues are affected which must be considered, lest in curing some small defect, we, indirectly, create a greater one.

The flat model now before you illustrates, practically, the action
of recoil and return from recoil, (or,
12 pr. B. L. Mark II.* to use an Americanism, "return to
battery") on the buffer, stops, and springs. These are all shown in

section for convenience of illustration, and the necessities of a flat model force me to place everything on the same plane. Before the gun is fired the liquid is all behind the piston, the springs as loose as the compressor nut will allow, and the gun against the stops. When the gun is fired it will be seen that the piston moves back, forcing the liquid between its edge and the inside tapering cylinder (thereby absorbing recoil and passing it on gently to the structure of the carriage), and at the same time compressing the volute springs.

If we remember that the recoil is absorbed partly by the pressure of the liquid against the piston, and partly, though in a much less degree, by the compression of the springs, we shall find all mountings easy to understand. When the recoil is complete the tension of the volute springs comes into play, and the piston is drawn back comparatively slowly, to its firing position. As a matter of fact the return motion is rather jerky, and close observation will show that the gun pauses for an appreciable time about an inch from the stops, and then moves on; this is an advantage as it lessens the blow on the stops. When these springs are of the correct strength, and the sides of the carriage are truly parallel in front, the stops have to sustain little or no blow. Stops are broken by travelling more than by firing.

I have here a drawing of the dragshoe brake, and some photographs showing its attachment to the carriage, also a wooden model of the proposed interchangeable dragshoe, one eye of which carries a link and the other takes the shackle direct.

These do not call for much remark, but there is one important point in the dragshoe and tire-brake controversy that has been less dwelt on than others, *viz.*, the relative effect of the brakes on the shooting powers of the gun. By tire-brake I do not mean the Royal Carriage Department monstrosity, but a tire-brake which, without requiring any under gear whatever, will grip the tire firmly from the very first. Postponing for a moment any discussion of the details of such a brake, let us see how the carriage acts when the gun is fired.

The drag-shoes lie behind the wheels, which leap back into them before skidding. I have placed a pencil on the ground between the wheel and the drag-shoe and found it remained untouched.

I have also placed a brick behind the drag-shoe, and found the carriage leaped over it with little or no damage to the brick.

With a hold fast tire-brake there should be no leap, the wheels skidding from first, and, though I do not believe that any practical mounting could totally destroy the leap, yet it can be so much reduced as to be practically no detriment to the shooting. An hydraulic mounting has to give rigid mounting of the same calibre, &c., a number of points in a firing competition on account of the increased accuracy due to the gentle way in which the buffer communicates the recoil to the carriage, and the consequent diminution of leap. With a rigid tire-brake the whole strain comes on the buffer from the first, whereas, with a drag-shoe attachment, the first part of the shock acts on the carriage as if there was no brake at all.

When the wheels are run back on to the drag-shoes before firing the leap appears less, and it would, I think, be worth while trying this point during the ensuing drill season when service batteries are firing for accuracy.

The two next drawings illustrate two tire-brakes, one used in the United States artillery and the other as proposed by me, if not for horse and field artillery, at least for all travelling siege carriages.

As my proposal was first made before the drawings of the American brake were known to me, any similarity between the two is quite accidental.

The American tire-brake acts on the rear of the upper part of the wheel. It is actuated by a spiral spring (a grave fault), and is chiefly brought into play by the recoil of the carriage itself, in other words, this carriage also to a great extent, leaps into its brakes.

Plate II.

The hydraulic tire-brake proposed by me stands upright above the axle, and is thus well out of the way. The drawing I have here is merely intended to illustrate the idea, and is not put forward as a finished drawing as to details of attachment, brake block, &c., for it would require considerable adaptation for each mounting.

Plate III.

When travelling the lip is turned clear of the wheel, but, when required for use, it is as shown, when two or three strokes of the lever will force the block hard down on the tire. Its action is as follows:—

On the up stroke of the lever the suction valve x opens and allows water to flow into t . On the down stroke x closes, y opens, the liquid is forced into t^1 , up the tube A , down the annular passage $b\ b$, through the ports, $b^1\ b^2$, into the annular tank $C\ C$.

This exerts pressure on the surfaces $d^1\ c^2$ and $c^2\ c^4$, but as $c^1\ c^2$ is free to move, it does so, bringing the tube B down and with it the brake block on to the tire. To release the pressure the screw release valve is opened, allowing the water to flow down A through t along v^1 and v^2 back to the main reservoir. The brake block being then forced up by the cup shaped springs.

This is a case of differential pressures, for there is a pressure on B equal per square inch of area to the pressure on $C\ C$, and in the opposite direction; as however the area $C\ C$ is greater than the area B , the brake presses *down*. Modifications of this brake may take the form of, (a) a cam or rack to draw up the brake block after the pressure is released; (b) an arrangement similar to that in the general service jack, whereby the separate screw R may be dispensed with, and the release effected by the main lever (c). Coupling up the brakes on each side so that only one lever would be required for both, &c., &c.

I would point out that one advantage of this brake is that it can be put on to any required extent, either totally skidding the wheels or merely checking them.

If necessary, the lowering of the trail in coming into action could be utilized to put the pressure on, but this would be of doubtful advantage.

The Swiss Schlapfer automatic brake was described at length in the June number of the Royal Artillery Institute Proceedings, but I just refer to the principle.

The gun wheels are skidded at all times when the horses are not pulling. The tire-brake, somewhat after the R. C. D. pattern, but held down on to the tire by springs under the carriage, is connected by a hook and chain and two rods to a traction bar at the back of the limber, which traction bar is directly acted on by the swingletrees, so that the pull of the team overcomes the spring and releases the tire-brake.

The proposed carriage for the cordite field guns shows a return to perfect rigidity, metal trunnion bearings, neat side pockets for case shot, and an arrangement by which all the small stores are carried in the trail, thus doing away with many of the outer attachments. The return of the R. C. D. to the drag-shoe brake is also noticeable.

Before leaving the subject of field artillery I would bring to your notice a tracehook attachment for wheel horses proposed by Mr. J. Y. Johnson, Chief Mechanical Engineer of the G. C. F. Fatehgarh. The hook is of Gambier pattern with a long nose bored to take the pin of the connecting rod. By pulling this rod smartly from the outside both tracehooks are released. It is claimed that it is easier to release a fallen wheeler by this method than by any other.

Before considering Q. F. and siege mountings, it will, I think, be as well to glance at the methods generally employed in checking recoil as regards the hydraulic part of the mounting only. These appear at first to be many, various, and complicated, but, by steadily putting aside all points that do not really affect the hydraulic results of the recoil of the buffer head through the liquid, we find our list reduced to four types and a temporary expedient. When it was found that the system of checking recoil used in the old R. M. L. carriage and slide mountings (which I need not tell you consisted merely in pulling or pushing a piston head through a tightly fitting cylinder, the liquid being allowed to pass through holes bored in the piston head itself) was unsuitable to the more modern gunnery, as cylinders of abnormal length would be necessary, an effort was made to modify the recoil so as to bring the carriage to rest within reasonable limits, and without any undue strain on the mounting itself.

The hydraulic problem here presented was to obtain "an increasing resistance to recoil with a constant internal pressure." The pressure must be constant, because the liquid has to be carried about (in travelling carriages) in the cylinder, and the resistance to recoil should increase because at the first shock of discharge, while the rifling of the gun is cutting into the driving band and before the projectile is well under way, a very great deal of the force of explosion is communicated to the carriage in the shape of recoil, but, after the projectile is well under way along the bore, this amount of recoil communicated is less. At the first shock the resistance must be least, *i.e.*, there should be the largest opening for the liquid to flow past the head of the buffer,

in order that the structure of the mounting may not be too severely strained ; but, afterwards, the opening must be smaller, so as to offer a great resistance to the decreasing recoil, and bring the carriage to a standstill as quickly as is compatible with strength, thereby keeping the length of the cylinder down to the lowest working limits.

The four principal types used are

- | | |
|------------------------------------|------------------|
| (1) A tapering cylinder..... | Plate V, Fig. 1. |
| (2) Thicknessing strips..... | „ „ 2. |
| (3) The Vavasseur piston head..... | „ „ 2. |
| (4) The Canet tapering core..... | „ „ 4. |

The tapering cylinder is the simplest, and is used in the 12 pr. B. L. It will be noticed that the piston fits more loosely in the cylinder when well home than it does at the extremity of recoil. The result is that the liquid pours freely round the piston head at the commencement, but finds less and less room as the recoil continues.

It is very simple and suitable to the lighter mountings.

Thicknessing strips were, I believe, introduced by Nordenfelt, and obtain the same result in a different way. The cylinder is the same bore throughout, but two slots are cut one on each side of the piston head. These fit as to width on two strips running along the inside of the cylinder and parallel to its axis, which strips are thin in the front but taper thicker towards the rear, thus gradually closing the ports cut in piston head, decreasing the space for flow of liquid, and increasing the resistance to recoil.

I take the Vavasseur head last, because it is slightly more difficult than the others, though it was the earliest and most scientific of all.

You will observe it consists of a piston and two discs, one rigidly connected with the piston rod and the other moveable round it. In the moveable disc are cut two uniform ports, and this disc has also projections that fit into the rifling grooves of the cylinder, which cause it to revolve round the axis of the piston rod as the piston head moves back in the cylinder.

The other disc or true piston head also has two ports cut in it of a section something like a V with a long flourish to the right arm.

The action is as follows :—

Before firing the ports in the two discs cover each other so that the whole of the V-shaped opening in the main disc is open for the passage of liquid : as the piston head moves back the loose disc is forced by the rifling to revolve, and, in so doing, gradually closes the ports in the main piston head, thereby increasing the resistance to recoil. The object of the V-shape is to allow of the passage of a considerable amount of liquid at the first shock of discharge, and to rapidly reduce it as the projectile gets under way and the strain on the mounting decreases.

The Canet system is found in most French mountings, in some mountings by English firms ; and in a slightly modified form, in the service 5" disappearing siege carriage ; while a very rudimentary application of the idea is found in the "compensating ram" of our 4·7" Q. F. mounting.

It consists, as do all other buffers, of a ram working in a cylinder but, unlike other buffers, this arm is itself hollow, having a fixed opening at the end.

A tapering core is fixed to the inner end of the cylinder and passes up into the hollow of the ram, the resistance to recoil being regulated by the varying space between the core and ram through which the liquid can flow.

The drawing represents the condition of the cylinder after recoil. Before recoil the ram is drawn out to the other end of the cylinder and the space between the ram and the face of the cylinder is nearly full of liquid. On recoil this liquid is forced between the head of the ram and the core, through the passage, into the increasing space behind. It is evident that the varying diameter of the core creates a varying space between core and ram head, thereby controlling the flow of liquid. This is the main principle of the Canet buffer.

On return to firing position the liquid passes freely through valves in the ram head.

Liquid also flows freely into and out of the space between the top of the core and the interior of the ram through the channels cut in the head of the core.

Canet holds that recoil is checked, not by the friction of the liquid in motion, but by the fact that the liquid has to be set in motion: i. e. the movement of recoil is actually communicated to the liquid.

These four types practically cover the whole ground of "modifications of recoil in hydraulic buffer", though there are of course several modifications of these.

If then we keep these four types in our minds, and remember that in recoiling, the buffer always compresses some spring or another, whether of metal, or steel, or air, whether in or out of, a part of, or apart from, the cylinder, we shall be able without the slightest difficulty to understand the principle of any siege mounting.

The "temporary expedient" to which I alluded before was an attempt to obtain in the old R. M. L. mountings an increasing resistance to recoil with a constant internal pressure. To do this long tapering bars, passing through holes in the piston head, are fixed to one end of the cylinder, and as the piston recoils, these rods gradually close the holes in the piston head.

The main object of horse artillery, next, perhaps, to mobility, is

to deliver the greatest number of accurately aimed rounds in the shortest possible time. To ensure this it would appear only logical to arm that branch with quick-firing guns. There are, however, several points to be considered in connection with this: the main point being—

"The necessity for a complete absence of recoil, to enable the gun to be fired from the shoulder."

To effect this it is absolutely necessary to use hydraulic recoil buffers, and a very powerful brake. There are objections to using hy-

draulic recoil buffers with horse artillery, but, as quick-firing guns are an impossibility without such buffers, we will, in considering these carriages, assume that the objection has been over-ruled.

Plate VI.

We will first consider the 6-pr. Q. F. gun and carriage proposed by the Maxim Nordenfelt, Company a specimen of which we have before us.

It will be noticed that the gun itself is trunnioned vertically, the gun trunnions pivoting in a sleeve or ring, which, itself, has trunnions resting in the trunnion bearings of the carriage the object of this is to obtain a small lateral play by hand, without any traversing gear, thus keeping the centre of gravity of the mounting as low as possible.

The recoil is taken by two Nordenfelt buffers, with the springs contained in the cylinder, as shown in the accompanying drawing. This is the simplest form of buffer for field service. There being nothing exposed to dust, and, practically, nothing to get out of order. With cordite cartridges, even if the buffer did become unserviceable, which, with a little care in camp, is an almost impossible contingency, the gun could still be used as an ordinary field gun, and fired by a lanyard, as the recoil of the new cordite rigid carriage, with dragshoes, is only about five feet on grass.

The tire brake proposed by the Maxim Nordenfelt Company is too much like an improved form of that proposed by the Royal Carriage Department for the 12 pr. B. L. Mark II. to find favour in this country, on account of its underneath gear.

I believe, however, that a hydraulic brake, as proposed in this paper, would answer the required purpose perfectly.

The principle of a tire brake is, undeniably, sounder than the principle of a nave brake, but it would be matter for consideration and experiment, whether, for the greatly diminished recoil of the cordite cartridge, a nave brake on the lines of that unsuccessfully tried on the 12-pr. B. L. Mark I carriage (but perhaps of stronger dimensions) might not act successfully; i. e. if a hydraulic brake was considered too complicated.

Dragshoes would be useless if the gun is to be fired from the shoulder.

The other details of the carriage are most easily seen from the specimen before us.

The next two drawings are merely variations of the same idea, one being semi-automatic, and the other an ordinary field gun.

The Q. F. mountain gun is on a similar principle, though here only one buffer is required. The top carriage is, comparatively, much higher than in any other carriage, and elevation is given by a toothed steel are under the gun and worm-wheel gearing. It is designed for three mules only.

The 4.7 Q. F. gun is a good specimen of a moderately heavy type, and one that has been very favourably reported on by the navy, and wherever it has been used for land service.

It is shown in outline on two drawings, and in section (with slight modifications) on a third drawing. From the section it will be seen that the gun and carriage rest on a live roller ring so as to be easily revolved, the traversing being effected from a side wheel by an arrangement of cog wheels and friction plates, which space will not allow me to detail.

The recoil is checked by a composite cylinder having a strong spiral spring in front, and, behind the spring, a compartment for liquid in which works a piston.

The breech of the gun is connected with the rear of the piston rod, and, also, by means of a cross bar and parallel rods, with a plate in front of the spring. When the gun is fired the piston is drawn back through the liquid, thereby checking the recoil, while at the same time the parallel rods fixed to the cross bar on the end of the piston rod draw back the plate in front of the spiral spring, thereby compressing the spring. When the force of recoil is exhausted, the spring brings the gun back into the firing position.

To prevent this action from being too rapid, a "compensating ram" is used. This consists of a core fixed in the base of the cylinder and passing up a hollow in the piston rod. This hollow, on recoil, becomes filled with water, which water has, as the gun returns to the firing position, to force its way out past the sides of the core. This is the rudimentary application of the Canet system referred to above.

The lithograph shows this carriage on a balance pillar proposed by the Elswick Ordnance Company for use in outlying forts, where no means or men exist for taking care of hydraulic arrangements. A heavy counter balance inside a hollow pillar enables the gun to be easily raised so as to fire over the parapet, or lowered to be loaded in safety by a rack and pinion actuated by hand.

I cannot, however, see the least use in applying this idea to a Q. F. gun, as the time required to raise and lower the pillar more than counterbalances that saved by the use of Q. F. mechanism. If the gun were so nicely balanced on rollers and ball bearings that the shock of discharge would take it down, and a single motion of a lever would bring it up again, there might be much to be said for it.

Even then, the Gruson-Schumann counterweight and lever system, referred to later, would seem preferable.

The defence of mountain passes must always be a subject of interest

Defence of mountain passes.
Plate VII.

to soldiers in India. I regret that the short time I had in which to prepare this paper has prevented me from obtaining reliable information as to the means used in Italy and Switzerland. As, however, Capt. Noble of the Elswick Ordnance Company suggests shielded Q. F. guns after a naval design for this purpose, and as the E. O. C. has a large factory in Italy, it may, I think, be presumed that Italy employs something of that kind. This may be an excellent idea for mountains in or near to which the population is fairly dense, and about which troops are numerous. For our more desolate and exposed passes, however, I think something in the way of a small turret, as pro-

posed by the Maxim Nordenfelt Company and illustrated by a drawing and photographs, would prove more useful. The particular turret illustrated is for a 6-pr. Q. F. semi-automatic gun. The turtle-back steel turret of 6-ft. diameter, rests on a line roller ring so as to turn freely. The edge of the parapet has a steel armour ring faced with concrete, somewhat after the Gruson method.

The gun is trunnioned on supports fixed to the inside of the turtle-back on each side of the embrasure, so that the gun, in front of its trunnions, projects permanently beyond the turret.

Two other supports of bent steel plate connect the traversing plate beneath the breech of the gun with the sides of the turtle-back, and also with the central vertical pivot on which the whole revolves. Opposite the embrasure is an armoured manhole, closing firmly from inside, through which the gunner or gunners pass to work the gun. The turret will not contain more than one gunner comfortably, though a second might find room.

Ammunition &c. is stored on the floor of the turret.

The only objection to this plan seems to lie in the smallness of the gun and turret. A somewhat larger turret, taking a 12-pr. or even 30-pr. gun, would seem to be more suitable for India, as it would command a longer range. An underground passage or chamber would also be necessary in India, as the heat of the turret in the summer would be very great, though much might be done to improve this by lining the turtle-back with felt, covering it with earth &c.

Possibly, also, a turret of the Gruson-Schumann counterbalance type, as described later on, might be more useful, but what I want particularly to lay before you is the general idea of small turrets, not requiring anything but manual labour to move them, as nuclei of the defence systems of mountain passes.

I will now pass rapidly in review a few of the more distinctive types of siege carriages, relying chiefly on the drawings to illustrate them, as long detailed descriptions take up too much time.

The 30-pr. is more truly a heavy field gun than a siege gun proper, being indeed very much like a large 12-pr. B. L. carriage, except that the volute springs are behind the buffer instead of in front of it. This does not change the manner of their action in any material way.

The large and powerful axles are a noticeable point in all siege carriages.

For the internal arrangements of the 30-pr. I will refer you to the drawing of the 12-pr., which is practically identical with it.

The 4" lattice girder carriage is shown because it is a type of those used on our North-Western defences.

4" Lattice Girder.
Plate IX.

There is nothing very peculiar about this mounting (which is merely designed to fire over a high parapet without being in itself too heavy or too costly), except the way in which the buffer is carried. The buffer itself is a

simple straight cylinder, but the axle forms a ring in the centre between the cheeks, and the buffer passes through it, thus giving a central pull without interfering with the build of the carriage.

The Americans obtain similar results (but without a buffer) in the

5" U. S. drawing. A noticeable feature of this is the substitution of a "manœuvring

bolt" and plate for limber hook and trail eye. Something of this sort was found in the old Bengal 6-pr. carriage.

5" U. S. disappearing.

The next drawing shows a very simple disappearing 5" siege carriage made by Messrs. Easton and Anderson, for the U. S. Artillery.

Its main action is as follows:—

A hollow steel shaft passes from the front transom to the end of the trail, being firmly fixed to both.

This shaft carries a fixed piston head.

Over the piston head fits a moveable cylinder, in front of which cylinder are fixed saucer springs. The cylinder is rigidly connected with the lower ends of the L-shaped elevating brackets. Pipes connect the front and rear portions of the cylinder, which pipes are fitted with the necessary recoil and raising valves.

On recoil the lower arms of the elevating brackets draw the cylinder forward, forcing the liquid out of the rear part of the cylinder, through the recoil valve and pipes, into the front part of the cylinder, at the same time compressing the saucer springs.

As the liquid cannot repass the recoil valve, the gun cannot rise.

When it is desired to let the gun up, the raising valve is opened. The pressure of the springs forces the cylinder back, driving the liquid from the front to the rear part of the cylinder. The elevating arrangement is very similar to that of the 6" H. P. disappearing mounting.

The attachment of the carriage to the pivot plate is by a cylinder and piston to take the recoil of the carriage, with springs to bring it back into position.

The 5" H. P. disappearing travelling siege carriage is the most recent

5" H. P. disappearing.
Plates X and XI.

advance in the application of the most scientific principles to travelling carriages, though it can only be used for redoubt or parapet work, as it cannot be fired except from its top position. It differs from the garrison H. P. mountings in that, when fired, it is held down in the loading position mechanically, thus abolishing at once all the detail of valves which render the heavier mountings so complicated. The holding down gear consists of a steel rod on the end of which teeth are cut on two sides, the other two being plain.

This toothed rod runs down through a clutch on recoil, but cannot return, as the teeth engage in the clutch and hold the mounting down against the pressure which is always pressing upwards.

When the gun is loaded it is "let up" by revolving the rod through a quarter of a circle, thus freeing the teeth, and bringing the smooth parts of the rod against the serrations of the clutch. As these afford no hold, the pressure in the cylinder lifts the gun into the firing position.

To lower the gun at drill it is necessary to haul it down with tackle worked with handspikes on the gun-like arrangement in front.

The cylinder of this mounting is extremely ingenious, and, as the gun and carriage will form a conspicuous feature in our North-West Frontier defences, I have described its action somewhat minutely in the Appendix.

A general idea of the action is best gathered from the model.

We now come to two howitzer mountings, in which steel springs take the place of compressed air as a means of storing up part of the recoil and utilizing it to bring the gun back into the firing position.

5.4" howitzer.
Plate XII.

The 5.4" 11 cwt. B. L. Howitzer requires little description, its nature being evident from the drawing.

The recoil is taken by two main cylinders *A A*, one on each side of the axis of the gun. Each piston rod, besides being connected with the howitzer, carries a cross head at its end, and to each end steel rods are attached which pass through the spiral springs carried in the upper and lower spring cases, and are connected with plates in front of the springs.

As the howitzer recoils the piston rods of the main cylinders are drawn out thereby compressing the springs, which, in their turn, when the force of recoil is spent, bring howitzer and pistons back into the firing position.

This howitzer has a pigeon hole limber, the general arrangement of which is at once seen from the drawing.

5.4" Howitzer Limber.

The gun metal bosses are turned round, as required, to admit of the extraction of each shell.

The 6" 25 cwt. B. L. Howitzer is also easily understood from the drawing. Its recoil is taken by two

6" Howitzer.
Plates XIII & XIV.

cylinders below the gun, the springs of which are in continuation of the hydraulic cylinder, the piston rod passing

through both. There is one peculiarity about it which exists in no other mounting yet in the service. It is called the "floating piston." The piston head *P* floats in the liquid in the hydraulic cylinder *X*, and has not only a piston rod *p* connected with the gun, but a tail *p*¹, which tail is larger in diameter than the piston rod, and is connected with nothing except the piston but moves freely inside the spiral spring *D*.

It also has a floating piece *B*, in which the piston head moves, and which itself slides in the cylinder case along the surface *S*¹.

When the howitzer is fired the piston is pulled through the liquid in the cylinder *X* in the direction of the large black arrow, the liquid passing round the piston head into the space *A*. The tail of the piston *p*¹, being of larger diameter than the piston rod, takes up more room, so the total space available for the liquid is less. Consequently the

liquid in *A*, being under pressure, has to make room for itself. This it does by forcing the floating piston in the direction of the pressure, thereby compressing the spring *D* in the spring cylinder. When the force of recoil is spent the springs force the floating piston back into its original position.

In doing so liquid is forced past the piston head and pressure is set up both in *A* and *X*. As, however, the area of the piston head exposed to pressure on the rear or *X* face is greater than that on the front or *A* face, the piston, bringing the howitzer with it, is forced forward by the differential pressure into the firing position.

It will be noticed that the mode of acting on the springs in these two howitzer mountings is entirely different.

In the lighter carriage the piston drags the springs forcibly with it on its backward journey, in the heavier the springs are compressed in a direction the reverse of that along which the piston is travelling: it is as if some force in it was acting outwards, forcing piston head and springs away from it.

The reason why the floating piston arrangement is better for a heavy mounting is that the travel of the springs is less. In the 5'4" the distance through which the springs are compressed must be the same as that through which the piston travels, in the 6" we can make the travel of the springs as small as we please. This is an immense advantage in dealing with heavy mountings, because the larger and more powerful the springs required, the more difficult it is to make them so that they will compress through a considerable distance. It is only recently that spiral springs of this size have been procurable at all, so anything that diminishes the compression required is an advantage. Personally I would abolish spiral springs and substitute saucer springs.

The study of hydro-pneumatic mountings is avoided by most people because they consider it a hard, complicated subject. Complicated it is, as to

Hydro-pneumatic. Plate XV. details, but hard it is not, and the complication exists merely in the details and not in the principle, which is as simple as possible.

Take an ordinary tin cylinder; cut a round hole in the bottom; cut a round flap of leather rather larger than the hole and fasten it on the outside of the bottom of the tin by a pin at one side, so that it covers the hole. Take a small piece of spring steel, pin it outside the bottom of the tin so that it presses on the leather flap. This is the recoil valve. Bore a small hole in the side of the cylinder just above the bottom and close it with a plug of wood; this is the "bye pass" or raising valve.

Bore another small hole on the other side and fasten in a tube, this is the lowering pump.

All the rest is mere detail, necessary because heavy weights have to be moved, involving the use of high pressures: these high pressures tend to cause leaks, which leaks must be prevented, hence the complication in detail which mystifies the student.

If you pour water into the tin cylinder, and then force down its plug of wood that fits it, the water will force down the flap of leather and pass out of the cylinder, because the pressure inside is greater than the pressure of the steel spring.

It is evident, however, that, once outside, no amount of pressure can drive the liquid back past the flap, because the harder it presses the closer it forces the flap against the tin, and the more firmly it closes the opening.

But if we "open the raising valve", *i. e.* if we pull out this plug of wood, the liquid is able to pass back into the cylinder without any regard to the recoil valve. And it does pass back, because it is under pressure, the spring pressure of the compressed air.

For the "pneumatic" part of the arrangement, the compressed air, is merely used as a spring, being the only reliable spring of sufficient strength that was available when these mountings were designed. Steel springs used to break, whereas compressed air can't break; now, the art of making powerful springs has made great strides in England, as we shall see presently.

If the gun was only required for actual service we should require no more; as, however, it has to be used at drill a means must be devised to bring the gun from the firing to the loading position without firing the gun. To effect this another hole is bored in the cylinder in which a pipe is inserted. Through this pipe the liquid is sucked, by a pump, out from the cylinder, and delivered into the reservoirs or air chambers.

The fact that recoil valve, raising valve, and lowering pump are, actually, complicated pieces of mechanism, is a mere matter of detail, due to the pressures dealt with, and does not affect the principle in the least.

Before entering on disappearing carriages we will glance at the
 9" R. M. L. High Angle. 9" R. M. L. High Angle carriage, as
 Plates XVI & XVII. some of these are likely to be used
 on our coast defences.

It is so called because it is intended to utilize the existing 9" R. M. L. guns on our Home and Indian Defences: as however, the guns, for India at least, are to be retubed to take a 10" projectile, the name is not a very accurate one.

The present 9" R. M. L. mounting only allows of an elevation to 15°, thereby greatly reducing the range power of the gun.

When the rearmament of India was first taken up, and 6" and 10" B. L. guns were introduced on disappearing mountings, which are, perhaps, the most complicated ever introduced into any service, H. E. Lord Roberts pointed out, in a speech delivered at, I believe, Pur, that excellent practice could be made from 9" R. M. L. guns on a High Angle mounting.

As a final outcome of this we have the carriage of which we have a drawing before us.

The trunnions of the cradle rest on two cheeks, which themselves rest on a circular bed, leaving a clear space in the middle for the breech to pass down, and allowing the gun to move through the enormous angle of 75°, viz. from—5° depression to + 70° elevation.

The lower part of the mounting, viz. that below the circular bed, is identical with that for the 6" H. P. disappearing carriage, so that the emplacement, roller path, &c. can be used for either gun.

The gun slides in a cradle, which has trunnions resting on the cheeks of the carriage, and also carries the recoil cylinders. There are two recoil cylinders, one on each side of the carriage, each of which carries a steel air chamber above it.

These air chambers are connected by tubes in rear of the cradle, and the recoil cylinders are similarly connected.

The fronts of the piston rods which work in the recoil cylinders are connected with a band round the gun in front of the reinforcing ring, so that the pistons move with the gun, the cylinders and air vessels being rigid in the cradle.

Before the gun is fired the pistons are drawn out, the liquid being behind them.

When the gun is fired these pistons recoil with the gun, driving the liquid out through recoil valves and up into the air chambers, thereby compressing still further the already compressed air in those chambers; at the end of the recoil the compressed air acts as a spring and drives the liquid slowly back through these narrow channels, thereby driving the pistons, and, with them, the gun, forward into the firing position.

The elevation is given by a large steel toothed arc under the gun, which gears into the elevating spindle in front of gun; cradle and cylinders all moving together.

The traversing is effected by two vertical spindles, at the end of which are cogged wheels gearing into a circular toothed rack, which runs all round the roller path.

The amount of traversing is shown on a graduated brass arc let into the floor of the emplacement, and the amount of elevation by the two dials at the side.

In this carriage we see ball bearings introduced to ease the elevating movement.

The trunnions of the cradle are stepped, the outer and smaller trunnions resting in ball bearings, and the main trunnions being kept just clear of the main trunnion bearings by two pair of saucer springs, one pair on each side.

The elevation &c. of the gun is done on the small trunnions in the ball bearings. The first shock of recoil, however, compresses the springs, and drives the main trunnions down into their bearings, thus enabling them to take the shock of recoil. The moment this has passed, the springs lift the gun up again on to its small trunnions, ready for the next round.

The hydro-pneumatic disappearing mountings proper, found in
6" P. H. India, are the 6" and 10" B. L. H. P. disappearing
Plate XVIII. carriages on our coast defences.

The limits of this paper and of your patience will not allow me to describe these complicated carriages in any detail, so it will be more interesting if we look at them generally, and compare them with carriages built elsewhere to fulfil the same end.

The two sketches on your right show the general disposition and idea of disappearing garrison carriages.

One shows a bird's eye view of the defences of the Yang-tse-kiang river, and, though not coming strictly within the limits of my subject, is interesting as showing the general disposition. The other sketch shows a closer view of a similar position.

Practically nothing can be seen but the tops of the shields, and an occasional gun rising just long enough to deliver its fire and disappear, but, on raising the flaps, we see how much has been done under ground.

In the English 6" carriage the trunnions of the gun rest on elevating brackets, pivoted at the front of the main carriage and elevated by a ram working in a cylinder, which cylinder swings on trunnions in the centre of the carriage.

This cylinder contains one central chamber for liquid and a number of air chambers arranged round it. When the gun is up in the firing position, the centre cylinder is full of liquid on which the ram rests. On firing, the ram forces the liquid out through the recoil valve, which only acts in one direction, into the surrounding chambers, thereby still further compressing the air in them.

When it is required to allow the gun to rise once more into the firing position, connection is established between the centre and outer cylinders by opening the raising valve. The pressure of the air then forces the liquid back into the centre chamber, under the ram, which is lifted, carrying the gun up with it.

Elevation and depression are effected by two rods connected with a band near the breech of the gun, and moving on arcs running in guides on the carriage proper. The travelling is similar to that of the 9" R. M. L. High Angle mounting.

The two accidents that happened at Aden a few years ago, when these guns were first mounted, serve to illustrate the two points that require special care.

In the first case the recoil valve was not properly set, too much opening being allowed. On recoil the liquid was forced out too quickly, the recoil was not sufficiently checked, and the gun and elevating brackets came down with a crash on the lower carriage, breaking one of the arms, and, of course, disabling the mounting.

In the second case the arcs to which the lower ends of the elevating rods are attached were not placed parallel in their guides. In consequence the rods got twisted and broken in recoil.

Except that it is much larger, the 10" mounting differs only in
10" H. P. detail from the 6", except Mk. II.

The great objection to these mountings is the number of valves &c. about them, all of which must be kept in perfect order if no accident is to happen. Also, if the gun is to be laid on a moving object, the No. 1 must lie exposed on the top of the shield, thereby partly destroying the object of the mounting.

The Ordnance Committee have already noticed this fact, and appear to acquiesce in it as unavoidable, yet Elswick has a mounting in which all this is avoided, and which is extremely simple, all valves being abolished.

This mounting is partitioned off into three parts.

In the centre part is the gun itself, supported by a plain hydraulic press (or ram and cylinder), the recoil being absorbed by large spiral springs, working in pairs one inside the other, and the gun being held down by a catch on recoil, the release of which is sufficient to let the gun rise into the firing position.

On the left is a space partitioned off where the layer stands, and either lays directly along the sights or by mirrors just below, which give a direct reflection of both sights and object, the laying being done in the mirrors as in the open.

All final adjustments of elevation or traversing are done by hand-wheels conveniently placed to the layer's hand, so that the whole mounting is completely under his control, and he can stand at his sights and order the gun to be fired at exactly the right moment without running any risk. This mounting is conspicuously superior to that now in use in our service, for it is always ready for use, requires no preparation at any time beyond filling the cylinder of the hydraulic press, and has no valves of any kind to get out of order.

This mounting would be far less likely to get out of order when exposed on a position than the H. P. mountings are, and would be easier to repair, provided a supply of spare springs were kept in stock, for spring making is a special trade in itself, which no one in India really understands, and only one or two in England. Possibly cup springs might be substituted for spiral springs, and if they could, it would, I think, be a great advantage.

I have two drawings showing a 6" disappearing mounting designed by Messrs. Easton and Anderson, the main feature of which is that the liquid, on recoil, passes into a special storage tank instead of into air chambers in the cylinder itself. There is a spring in this storage tank which is compressed by the liquid, which is driven in from the main cylinder by the pressure of the ram on recoil. As the liquid cannot get back past the recoil valve, it remains in the storage tank till the "raising valve" is opened, when it is driven back by the pressure of the springs into the cylinder under the ram, thereby raising the gun.

Another design by the same firm shows a somewhat similar mounting arranged on a railway truck, only in this instance the storage tank is carried on the front of the truck. Although I think this particular kind of mounting is wasted on a 5" gun, it is a very good idea for a 6" gun, if required to be run up into the actual emplacement for the attack of a fortress. The alteration in design to suit the larger gun could easily be made. In this case air is used as the spring, so the mounting is of a truly hydro-pneumatic design.

One word as to the cover used with different heavy mountings. The English Elswick and French Canet mountings have fixed shields, through an opening in which the gun rises and falls. The Germans use a Gruson-Schumann turret, the top of which rises and falls with the gun and carriage, the whole being actuated by a counterweight and lever; while for the Belgians, Captain Mougin has designed the oscillating turret

Small prints of these latter have been distributed, and require no special description.

I have been able, in the course of this paper, to touch but briefly and incompletely on the points dealt with, and I fear that your patience has been greatly tried, but matters like the introduction of Q. F. mountings, the defence of mountain passes, and the rudimentary principles of hydro-pneumatic carriages, to say nothing of other matters, cannot be dealt with, however imperfectly, without a certain amount of time; like springs, there is a limit to their compressibility.

May I close with one word to the Garrison Artillery, which I hope will not be deemed presumptuous in one so junior as myself, since it is spoken in all humility.

Let us study our armaments more diligently, let us go deeper into the why and wherefore of our guns and carriages, let us look clearly at the simple principles they involve. The sciences of mechanical engineering and her sister hydraulics are too prone to wrap themselves in a veil of mystery, which must be torn away if they are to be understood. Will you take the word of one who is, as yet, but a student at the very threshold of those great sciences, when I say that the very rudiments are interesting and will well repay study. The mere fact that a separate body of Inspectors of Ordnance Machinery is considered necessary, is a grave reflection on our intellectual powers as a regiment. Surely we must not admit ignorance of the details of those weapons which are the very reason of our existence.

Let the advances in our own science come from within our own body and not from outsiders, let us recognize that we must, now more than ever, prove ourselves a scientific corps or consent to be subordinates where we should be masters.

My sincere thanks are due to Sir Joseph Whitworth & Co., for the models, drawings, and photographs; to the Maxim Nordenfelt Company, Messrs. Easton and Anderson, and the Elswick Ordnance Company for the drawings, photographs, &c., they have so kindly lent me, and to Condr. Beauchamp, draughtsman of the Gun Carriage Factory, Fatehgarh, to whose untiring energy I owe most of the drawings with which I have been enabled to illustrate my lecture.

[NOTE.—Drawings to illustrate this lecture will be published in a subsequent number of the Journal.]

APPENDIX.

NOTES ON MODELS &c. OF GUN CARRIAGES AND CANET SYSTEM OF MOUNTINGS.

DISAPPEARING CARRIAGE.

Photo 999, 999A, 1000, and 1000A.

Model, tracing of Brake.

The photos show a carriage made for the Spanish Government for a 15 cm(= 6 inch) Ordonez Gun of 6.2 tons weight, and 32 cal. long.

Projectile 92½ lbs. and 100 lbs., charge 35¼ lbs., velocity 1804 ft.

The general construction of carriage is similar to model, *i. e.* gun mounted on two levers, which, through links connected at lower ends with crosshead of piston rod push piston into brake cylinder, water displaced by immersion of piston rod enters two recuperator cylinders, the plungers of which are acted on by a series of Belleville springs. The water passes from brake cylinders to recuperator cylinders through a non-return valve operated (in photo) at side of carriage, and (in model) in front of carriage, underneath. Gun remains down until valve is opened for rising. Valve is automatically closed by the ascent of gun into firing position.

The Canet brake cylinder is illustrated on tracing. The control of fluid from one side of piston to other is effected by the form of the central bar which regulates the size of orifice through the piston, the rate of return is controlled by small fixed orifices with valves in piston. The water displaced by entry of piston rod into cylinders passes by an orifice at rear end of cylinder to the non-return valve.

This system of control for brakes is common to all Canet mountings.

The form of taper central bar is regulated to give nearly a constant pressure.

The drawing of the brake cylinder is one used on the photo 967 for a 10 inch B. L. gun, and the diagram shows the velocity curve with this gun and service charge.

The shield of the gun carriage is provided with two sight stations; and rough sights, in addition to those on gun, may be used.

The elevating gear shown on model and in photo is a parallel motion, the gun rising at the angle to which the elevating gear has been set, though, of course, it is adjustable throughout the travel of gun and up to the moment of firing. The elevating wheel in photo is shown at front side of carriage, and the box behind the wheel contains the gear arranged to allow slip in case of undue stress.

This elevating arrangement is not essential, and links may equally well be employed sliding in axis on carriage.

The mounting is arranged upon a base plate with live roller ring, clips, &c.

All stresses are horizontal by the disposition of the brake and recuperator cylinder.

In the model the springs are enclosed in the large outer cylinders, the smaller cylinders in line therewith being the recuperator cylinders, equal in volume to the displacement of the piston rod. In the photo the springs are encased between the two girders carrying the rocking levers.

CASEMATE CARRIAGE.

Photo 992.

Shows a carriage for a small embrasure made for the same gun as the disappearing carriage previously described.

The pivot centre is struck from the centre of the embrasure, and the pivot plate is radiused from this point. The gun is mounted on a slide pivoted to the upper carriage.

The brake cylinder is similar to the illustration on tracing, and the water displaced by the piston rods which are fixed, enters two recuperator cylinders cast in one with the cradle and brake cylinders. The plungers of these recuperator cylinders abut on springs in casings which appear in the front of the carriage.

The maximum angle of elevation is 15° . The elevating handle being on the far side of carriage in photo.

Training handle and gear shown in photo.

COAST DEFENCE CARRIAGE.

Model and Lithograph pl. 8, figs. 13—16.

This carriage is a type of many made for the French Government by M. Canet for coast defence—the material is cast iron, and the guns are the cast iron tube steel hooped type.

The Brakes are simple pulling brakes, the construction being similar to the tracing illustration but with action reversed.

The training is performed by a chain instead of rack, as being less liable to be deranged with sand, &c.

The loading arrangement is shown on the lithos, the shot bracket receives shot from a barrow, and brings it up to gun breech. The spring shown in the Lithos is intended to ease the load to be lifted by hand winch. The shot bracket forms the loading tray.

CENTRE PIVOT CARRIAGE.

Model—Lithos Pls. 1, 2, 3.

This is a naval type, mounting Brake cylinder with central control bar and pulling brake. Elevating apparatus of similar construction to that shown for disappearing carriage, or can be fitted with worm wheel and worm on shaft worked from rear of mounting.

TEN INCH TURRET MOUNTINGS OF H. M. S. "DEVASTATION."

Photos 967, 968, 971. Lithos pls. 10—13 figs. 1, 4, 5, 6, 7.

These mountings were made for the refit of turrets of H. M. S. "Devastation" in place of those for the 12 inch M. L. gun.

The Brake system is as shown on tracing, but in addition there are two compensator cylinders, which receive the water from the cylinders as it is displaced by the immersion of the piston rods, and, by means of

a non-return valve, lock up the water to prevent the run out of gun, until a bye-pass valve is opened ; and this can be adjusted to control the speed, if run out, if ship is heeled and induces a too violent run out by reason of great inclination of sides. On the other hand, if the heel is such as to neutralize the descent by gravity, owing to slides being horizontal, then a spring under the cradle at each side pushes out the carriage until it is in the firing position.

If bye-pass valve is left open, gun will at once return to run out position independent of direction of heel.

The Lithos illustrate action of the compensation cylinder diagrammatically. In the actual carriage there are two of these cylinders each equal in bore to the diameter of brake piston rods, but this is immaterial unless construction requires it, as one cylinder of a volume equal to the two piston rods may be used. Fig. 4 Pl. 12 shows a hand pump for running gun in.

BUFFER OF 5" H. P. DISAPPEARING SIEGE CARRIAGE.

The drawing shows it at the moment the gun has recoiled, and before the clutch is released. The cylinder is filled with liquid and air at the requisite pressure, through the cock which is regulated by the plug *Y*, and up the hole in the centre of the steel spindle into the cylinder. When the gun is up ready for firing the gun metal cylinder or ram is out of the steel cylinder, the inner face of its head pressing against the inner face of the mushroom head, where a buffer is fixed, and the liquid fills the cylinder up to above the mushroom head. On firing the ram enters the cylinder, moving down towards the position shown on the drawing ; as it moves down the liquid is mostly forced up between the head of the cylinder and the tapering mushroom headed steel spindle, *over* which the hollow ram has to pass while it presses *into* the steel cylinder, some of the liquid flowing through the space *pp*¹. At first, owing to the great difference between the diameter of the neck of the spindle and the inside of the ram, there is a rush of water up past the head, this corresponding to the rush through the deep part of the V-shaped recess in the Vavasseur head, and designed for the same reason, *viz.* to lessen the great shock transmitted to the carriage while the rifling is cutting into the driving bands of the projectile which has not yet got properly under weigh. As the ram travels into the cylinder, the space between the spindle and the ram head decreases, thereby increasing the resistance to recoil, till the ram is brought to rest at the bottom of the cylinder.

Meanwhile a small quantity of the liquid is forced through the passage *v v*¹ into the narrow space *R*, for a reason that I shall shortly come to.

We now have the gun and ram held down by the steel clutch in the loading position, the state of the cylinder &c. being that shown in the drawing. We have the liquid as shown by the blue shading filling the spaces *R* and *S*, *viz.* the spaces between the ram and cylinder and ram and spindle, and also to a certain distance inside the ram above the mushroom head. Above the liquid we have the compressed air, more

compressed now than when the gun was up, because the ram has entered the cylinder, thereby displacing a corresponding volume of liquid which is forced up the hollow of the ram, and, to find room, has still further to compress the air.

When the clutch is released, the compressed air, which, we must remember, is *always* exerting an upward pressure against the top of the inside of the ram, forces the ram up, thereby "bringing the gun up." To prevent this rise from being too violent (when the first round was fired from this mounting the return from recoil turned the whole mounting over to the front so that the muzzle of the gun was buried in the ground), we have the resistance of the liquid in *R* forcing its way out between the cylinder and the ram along *v v'*, and pressing against the small inner face of the ram head which closes *R*, thus resisting and checking the main movement of the ram, which is the reason why a certain amount of the liquid was allowed to escape into *R* during recoil.

Of course a certain amount of resistance is also given by the liquid in *S*, but not much, as, such as does not flow freely past *q q*, is carried up, for the moment, with the rising ram.

TURRETS.

The English idea is to leave a large opening in the top shield through which the gun rises and falls, and the French Canet system is in this respect similar to the English. This makes the interior of the mounting slightly more vulnerable to curved fire, especially from quick firing guns. To avoid this, two systems have been introduced on the continent.

The first is the Gruson-Schumann system of the famous German armour maker, of which a few sketches have been distributed.

In this the whole real work is done by the counterweight, hydraulics being practically excluded. It will be seen that a portion of the shield rises and falls with the gun. This enables all but the top of the shield to be constructed on the heavy lines required by Herr Gruson's cast iron armour.

In the Mougin system, tried by the St. Chamond Company for the Belgian Government, the whole turret oscillates, lifting its edge before firing to the necessary elevation (up to 24°), and depressing it afterwards till the opening in the shield is below the outer edge to facilitate loading. Both Gruson and Mougin shields are on what I will call for simplicity a "glacis and turtle back" system, *i. e.* part of the shield is fixed and projects over the edge of the emplacement, while the moveable part of the shield is much curved, its edge coming well below the run of the fixed portion. In the English and Canet systems the moveable shield forms the only steel defence, and fits as closely as possible into the concrete walls of the emplacement.

HIS EXCELLENCY THE COMMANDER-IN-CHIEF, in introducing Captain Townsend, said :—This is a technical subject, and I think I am fully justified in saying that nobody is more suited to unfold the mysteries of the construction of gun carriages than Captain Townsend. Every day this subject becomes more and more important in the education of the field artilleryman. As artillery science advances, it has been necessary to call in the aid of science to enable a gun carriage to resist the shock of the explosion, and it is even more necessary for a field gunner to know more of the science of the gun carriage.

DISCUSSION.

MAJOR-GENERAL A. WALKER, C. S. I., Director-General of Ordnance in India, said :—Your Excellency and Gentlemen,

In listening to this lecture I have been much struck with the simple manner in which Captain Townsend has tackled a difficult and technical subject. I have always been of opinion that if a technical man knows his subject well, he can explain it in simple language, and does not hide his ignorance under the cloak of abstruse and technical terms. In this matter of simplicity Captain Townsend has done remarkably well.

Nor am I astonished at it, as I know the amount of hard study that he has undergone, to enable him this day to appear before you as a lecturer. Captain Townsend has but lately returned from England, where he studied and saw all the latest improvements in modern gun carriages in the Royal Carriage Department at Woolwich and in the well-known private firms of Whitworth, Armstrong, Maxim, Nordenfeldt, Easton and Anderson, &c., &c.

Captain Townsend was employed on this duty for over twelve months. He is also well qualified to speak on these subjects, as he is a member of the Institute of Mechanical Engineers, London. I know of only two other officers in the army who have earned this distinction. They both belonged to the Royal Engineers.

Captain Townsend obtained this distinction by passing the steam examination of the Board of Trade in addition to a seven years' service in the Indian Ordnance Factories. Hard work, natural abilities, and a decided turn for mechanical engineering obtained him this honour, not interest.

Turning to the lecture, the models he has exhibited and explained in so simple a manner of the principle of hydro-pneumatics with tin cylinders is much to be commended. I have never heard before this principle put in such a clear and effective manner.

I entirely agree with the lecturer in his concluding sentences, in which he urges every officer who has anything to do with coast and frontier defence armaments to study well the principles involved in the construction of both ordnance and carriages, so that they may be able to make the best use of these splendid weapons that have been placed under their charge.

The mountings that are likely to give the most trouble are those of 10-inch and 6-inch B. L. guns of the coast defences and the 6-inch B. L. Howitzers of the North West Frontier defences and siege trains.

The models and drawings exhibited are excellent of their kind, and the Ordnance Department in India are much indebted to the English firms who supplied them. In this connection I would specially call attention to the models kindly lent by Sir Joseph Whitworth and Company. These models were first brought before the public in the London Naval Exhibition of 1891.

It only remains for me to say that more than half the drawings illustrating this lecture were done in Fattchgarh by Conductor Beauchamp, who has so ably demonstrated throughout.

Major-General LEWES, R. A., Inspector General of Artillery in India, remarked that the introduction of quick-firing guns was simply a matter of time, but then the question of carrying enough ammunition in the wagons arose. Even at present we were not able to take enough ammunition into the field with us. Gun carriages should be reduced to the minimum possible weight to carry the maximum number of rounds.

The lecturer explained that the subject hardly came within the scope of the present lecture, which was a purely technical one, and that the question raised could not be answered without much study.

The proceedings closed with a vote of thanks to the lecturer, proposed by his Excellency the Commander-in-Chief.



At Simla on September 5th 1893.

Maj.-General W. GALBRAITH, C. B. Adjutant-General in India,
in the Chair.

ARMY GYMNASTICS.

By Major Hon. A. E. DALZELL, Oxfordshire L. I., Inspector of
Gymnasias, Bengal.

The subject of physical training in general and of Army Gymnastics in particular is one which has not, I venture to think, received that full attention of which it is so undoubtedly deserving.

There is a tendency amongst a certain class of superior persons to pretend to ignore the body as something altogether too material, too coarse and too common to be deserving of much attention, and to maintain that intellectual culture is everything, but these persons lose sight of the fact (so well known to the ancients) that intellectual superiority is dependent on corporeal fitness, and for a nation to become truly great it is necessary that it should cultivate the physical being of its youth so that their mental qualities may be properly nourished and maintained.

I do not wish to weary you with a historical retrospect, but it may be of interest to take a glance back and note the influence exercised by physical training on the world's history.

"Everything that we enjoy save the fruits of the blind forces of nature, comes to us from Ancient Greece."

Such were the words of one who had studied the history of civilization profoundly; and all who possess the faculty of analysis and the historical spirit may verify the assertion by independent research.

Admitting then the vital and far reaching influence on the world's history of Attic culture, we are lost in astonishment at the disproportion between that influence and the community which wielded it. Attica, that cradle of modern civilization, was a patch of rugged soil smaller and less populous than any Indian District, and even if we add the other States of Ancient Greece and its colonies, we still deal with an area smaller than Ireland or Portugal.

Whence the secret of the unique greatness of the Greek people in every branch of human love, in all that differentiates the civilized man from the savage? It lay in the frank recognition that the systematic training of the intellectual and physical natures must proceed "*pari passu*", that the brain cannot perform its function unless it be supplied with healthy blood. I will not inflict upon you the story of the Great Olympian Games when champions from every part of Greece met to contend in Athletic exercises for a simple garland valued far above rubies;

when every town, and every village, had its gynosium and when the triumphs of the circus were rated as high as those of the tragic muse. For from before the time of Hippocrates the celebrated physician, 460 B. C., Gynosastic exercises had been introduced into Greece to counteract the increasing luxury and indolence, and these exercises were shortly after combined into a regular system, and Gynosasia where they could be carried out were found, first by the Lacedemonians and subsequently at Athens (2nd and 23rd books of the Iliad.) Suffice it to say that the combined physical and mental training undergone during a long course of years by the flower of Greece produced a race of men whose works are the admiration and despair of their successors.

Burke has called eighteenth century England "A moon shone upon by France." It is equally true that ancient Rome was but a pale reflection of her great forerunner, and one might paraphrase a well known saying of the Iron Duke's by averring that the Roman Empire was won in the Gynosasium. The Romans adopted the system introduced by the Greeks and constructed Gynosasia on a magnificent scale. Attached to many of these buildings were extensive baths, the whole being known as "Thermæ," and the exercises consisted of running, leaping, wrestling, boxing, weight lifting and hurling, the use of apparatus for developing the muscles and combats with the different descriptions of arms then in use. Their legionaries who carried the Eagles of their country triumphantly to the uttermost ends of the then known world, practised athletics and trained as assiduously as they drilled. Only when the rising tide of luxury led the Roman to prefer the languid pleasures of the Bath to the fierce joys of the Gynosasium and the Amphitheatre did Rome's imperial spirit slowly wane and she fell an easy prey to barbarians injured to hardship by self-denial and suffering.

In the long dark ages which followed the fall of the Roman Empire there was a complete divorce between the culture of the mind and of the body. Hence the steady retrogression in all that sweetens and elevates existence, which marks the world's history for nearly a thousand years. Not till chivalry had reached its apogee and had began to teach the necessity of a strenuous training in the use of arms, and till the Renaissance opened men's eyes to the buried glories of ancient art, did the world awake from its long sleep. The heroes of the "spacious times of Great Elizabeth" were men who had reverted to the old Greek system of dual culture, but from the time when fighting at a distance became general, owing to the improvement in firearms and those personal encounters in which strength, muscle and skill told so heavily, almost ceased to exist, the attention paid to Gynosastics gradually decreased and finally vanished altogether. It is only from the commencement of the present century that the science revived, Prussia leading the way in 1806. Napoleon's genius riding as it did on the revolutionary whirlwind galvanized the French armies into life and over-ran Continental Europe, but one of the results of the ruin of the old Prussian Military system at Jena was the limitation of the standing army to a figure rendering that organization useless to the enemies of France. The north German people, writhing under defeat and humiliation, formed

the "Tugelbund" or "League of virtue" with the object of throwing off the stranger's yoke. In its organization was the creation of innumerable gymnastic clubs, in which the flower of the Prussian youth were assiduously and systematically trained to use and develop their thews and sinews, that they might be a service to the Fatherland in the day of liberation. The taste thus developed spread and strengthened, and as to the training thus obtained must be attributed the vigour which drove out the French army of the first Empire in the past, so also no small part of Germany's military and commercial greatness in the present is due to that course of gymnastics which forms a part of every school curriculum, and is deemed as important to the soldier as drill or musketry.

From Prussia the movement spread to Sweden, where it took deep root, and has gone on developing, until now gymnastics form the most important feature in the Scandinavian course of education.

In 1844, owing to the marked advantages derived by the Prussian troops from the physical training they received, the system was adopted and improved upon in the French army, and from that time has gradually been taken up by almost every Continental nation, and introduced as part of the necessary training of its soldiers.

Every country is now alive to the prime necessity of strengthening and developing the physical powers of its army and of making as much as possible out of the raw material; and in these days of short, sharp, and decisive campaigns, when mobility and the power of concentration mean probable victory, the importance of every soldier being taught, not only to withstand fatigue and hard work, but to use his limbs to the full extent of their capabilities, cannot be overrated.

In France and Sweden we have two striking examples of the result of this thirst after physical excellence, for although the soldier of the former country is small and young, he is capable of covering many miles without fatigue, carrying on his person a total weight that would horrify his larger brother in the British army, whilst any one who has visited the latter country must have been struck with the singular activity of its inhabitants.

That savage nations have always devoted great attention to physical training and prowess is well known, and of late years we have in the Zulus a remarkable instance of what can be effected by sound physique (armed only with spears and inferior weapons) when opposed even to the best arms. So important was physical fitness considered by this people that their young warriors were forbidden to marry for fear the pleasures of the domestic hearth might tend to soften and enervate their bodies, and only such who had proved their bravery and aptitude for war were allowed this privilege. The mobility of the Zulu army owing to its physical condition was such that it thought nothing of covering 70 or 80 miles a day, and we have every reason to conclude that the massacre of Isandula was greatly the result of the suddenness and rapidity with which one of its "impeys," known to be 70 miles distant the previous day, made its attack.

The English people has always been addicted to manly sports, a fact which has told profoundly on the formation of the Empire, but no regular system of physical training was introduced into the British army until comparatively speaking quite lately. Ever slow to move we did not follow the example set by other nations in this respect until the year 1858-59, when owing to the report of a special committee, sent to France and Prussia to inquire into the system which had proved so beneficial in those countries, a somewhat similar one was established in our army, which has gradually gone on developing until there is now no military station of any size without its gymnasium, no regiment without means at hand to carry out a complete course of Fencing, Gymnastics, and the use of arms.

Much, however, still remains to be done, and until gymnastics and the use of arms receive that full attention they so undoubtedly deserve, much of the value of these gymnasia and their appliances is lost, and the raw material is only half welded into the finished article.

It is still the fashion with a certain class of officers, many of whom could do much in the opposite direction, to rather pooch-pooch gymnastics and to assign to them a very secondary position in a soldier's training. These officers lose sight of the fact that physique is the foundation of an army, the very key-stone of its existence. Without it you can do nothing, you may teach a man everything that is now considered necessary to constitute the perfect soldier, but if from want of physique he goes to pieces when he is wanted, he is manifestly useless.

It would be interesting to know the exact number of men placed hors-de-combat annually from physical causes. We know that over the strength of a brigade is generally non-effective from one cause; we know that drafts arrive in this country composed often of immature and weakly youths, many of whom, alas, come out only to die; we know that from want of proper development and exercise many men are unable to march or even to carry their arms. We see in every "little war" the strength and mobility of the operating force reduced by men falling out from fatigue, want of stamina and general weakness. We know that these men have to be replaced by others and that every non-effective soldier increases the cost of the expedition. It is obvious that the fewer men required for any undertaking, the less the cost of that undertaking will be, and that if one man can be made to do the work of two, but half the number will be required.

We have gone through many phases of military training of late years and our opinions now are very different from those held by our predecessors. In the pre-Crimean days (for instance,) musketry was practically non-existent, for it was not considered necessary that a man should discharge his musket except at his foe, and it was customary to inure soldiers to the hardships of war by making them undergo exposure and discomfort in time of peace.

It may be argued that we did very well in the old days and always "hested" our adversaries. So we did, comparatively, but our adversaries have not been standing still and the conditions are changed. Our stout hearts enabled us to accomplish much, but stout hearts backed by sound bodies and greater skill will help us to do more.

Musketry, regimental institutes, rations, nursing sisters, &c., have all had their champions, and we see the result. No one unfortunately has yet taken up the cause of army gymnastics in a similar manner, and although the military authorities at home appear to recognise the value of physical training and (as previously stated) the United Kingdom is well found in gymnasia, appliances, and an instructional staff, Gymnastics and the use of arms have hardly yet taken that prominent position to which they seem so justly entitled.

In India, with which we are now more immediately concerned, no attention was paid to the physical training of the soldier until the year 1866, when "the introduction of a system of military gymnastics among Her Majesty's British troops serving in India," was sanctioned by His Excellency the Governor-General in Council, and an experimental scheme published in G. O. 167, dated 9th August 1866. Since that time considerable strides have been made, but the general status of army gymnastics in this country still leaves much, I venture to think, to be desired and the main shortcomings may be briefly classified under the following heads:—

- (a.) The want of more covered gymnasia of a suitable type.
- (b.) The weakness of the Instructional Staff, and the inferior position held by such staff.

The first of these is, I am aware, almost entirely a question of money, whilst the second is one partly of money and partly of organization.

A comparison, however, between the condition of affairs at home and what exists in this country as regards these two particulars, may be of interest as showing how much behindhand we are out here.

In Great Britain there are no less than 35 large gymnasia specially constructed on a standard plan and completely equipped with all necessary apparatus and stores. Most of these buildings are of the type known as "first-class Gymnasia," whilst the remainder are equally good but somewhat smaller.

In India, with a far larger force and a greater necessity for keeping its units in perfect health and training, but four "first class" buildings exist, namely those at Lucknow, Umballa, Poona and Secunderabad, the last being a large converted Barrack Bungalow.

In the 37 large stations of the Bengal command all containing British troops, there are still 18 supplied with out door apparatus (of a very inferior description) only, whilst in many of the remainder, misappropriated Barrack-rooms, some forming *excellent* gymnasia, but others merely makeshifts, are the only schools of instruction. At such large stations as Rawal Pindi and Quetta the accommodation is still miserably inadequate, and instruction is rendered not only difficult but almost impossible. In the whole of the Bundelkhund district there is not a single covered gymnasium, and at Bareilly the men of the 2nd Oxfordshire Light Infantry have only lately been provided with a building through the generosity of the officer commanding that regiment, who at his own expense, has fitted up a gymnasium for their use. That such a building was not only wanted, but is appreciated, is

sufficiently proved by the voluntary attendance of the men, which during the last quarter exceeded 1,500. In the Madras and Bombay Presidencies a similar condition of affairs exists.

In Great Britain the Instructional Staff consists of an Inspector, an Assistant Inspector and 14 Superintendents, all qualified officers drawing staff pay, one Sergeant-Major, two Quarter-master Sergeant Instructors; 27 first class Sergeant Instructors, and 28 second class Sergeant Instructors. These are all exclusive of the regimental Instructors. To each of the 35 large gymnasias a Staff Sergeant Instructor is permanently attached having under him the regimental Instructors of the regiment, or regiments, quartered in the station. To each district there is a superintendent who visits the gymnasias in his district once a quarter, and is responsible for the proper training of all men in that district, an annual inspection of all districts being made by the Inspector. The Budget Estimate for the maintenance of the gymnastic staff at home amounts to £ 6,000, not counting regimental Instructors or those allowed to the R. M. Academy and R. M. College.

In India there are but two special officers drawing staff pay, a marked contrast to the number attached to every other department. Superintendents are allowed to the four first class gymnasias, but the appointments are unpaid and the officers accepting them are unseconded in their regiments, hence difficulty is experienced in filling them, and even when filled the full use of these officers is not secured, for they might with advantage be utilized to superintend a district, as at home, and exercise that closer supervision over the training of regimental classes which is so much needed and which cannot be given by the two Inspectors alone owing to the immense charges with which they are entrusted. Next in gradation come four Chief Instructors, one to each first class school, who are each assisted by three staff Instructors, or 12 in all. In addition to these there are, of course, the regimental Instructors employed in the different gymnasias throughout the country, but these are not included in the permanent staff, and as at home, come under a different grant in the estimates. The total expenditure for "Gymnastic Instruction" shewn in the Budget Estimate for 1892-93 amounts to Rs. 42,860, or rather less than half the sum allowed at home for this purpose, the pay of the regimental Instructors being omitted in both cases. (Including all regimental Instructors the expenditure in India amounts to Rs. 95,777).

Now as regards the want of more covered gymnasias of a suitable type. Out-door apparatus, of which there is still a good deal in existence, is of little or no use; it rapidly deteriorates, under a tropical sun and rainfall, and for nine months out of the year it can only be used in fine weather and during the cool hours. Men rarely frequent an out-door gymnasium voluntarily, and there is certainly no pleasure to be obtained from the use of warped and rough apparatus, with either a muddy or very dusty floor underneath and generally a hot sun or heavy rain above.

The system of military gymnastics is based on exercises absolutely necessitating the supply of proper apparatus, both fixed and movable.

These exercises are arranged progressively and are divided into two portions, the first cultivating the resources of the body by developing its parts, teaching the use of its limbs and adding to its dexterity and rapidity of action; and the second applying the physical powers obtained in the first to aid directly in the performance of professional duties; whilst the whole resources of the gymnasium so work upon the condition of the soldier that he acquires agility of movement, hardness of constitution, and energy and strength of frame, enabling him to undergo fatigue, exposure and privation, and to overcome obstacles, difficulties and dangers.

No one who has seen a squad of men before and after training could possibly question the enormous benefits derived therefrom, and a glance at any measurement returns of classes dismissed instruction sufficiently prove the great increase in bodily development arising from even a two months course. I have here half-a-dozen "class reports" received from different regiments during the past quarter which some of you may like to see. They have been taken at hazard and show no special development, but it will be perceived that of the 150 men who were trained in these six regiments an average increase of over one inch in the chest, half an inch in the fore arm and one and a half inches in the upper arm was obtained, and this after an average attendance of three weeks only. Great however as are the benefits derived from a compulsory attendance at the Gymnasium, it is a question whether those accruing from a voluntary attendance are not of nearly equal importance, but to ensure such attendance it is absolutely necessary that the Gymnasium itself be made attractive.

The great utility of, and necessity for, good covered buildings to which men can resort at any time is, I think, but imperfectly appreciated. That soldiers will frequent a proper Gymnasium whenever one is found them has been clearly proved by the large voluntary attendance at those stations where suitable buildings exist, and I have no hesitation in saying that I believe the existence of such buildings to be a very great check on that disease which undermines the health and physique of so many of our soldiers, for it affords a man occupation for his leisure hours, enables him to work off his superfluous energy in a beneficial manner, and by giving him a certain pride in his own agility and strength, induces him to be more careful in the proper maintenance of his physical being.

It is chiefly in the evenings that voluntary attendance would take place, but at present no provision is made for lighting Gymnasias, and except where arrangements for this purpose have been made regimentally all buildings are unusable after sunset.

In regard to the second point, *viz.*, the Instructional staff, its weakness and status, or rather want of status.

It is obvious that to carry out any system of instruction thoroughly and satisfactorily, it is necessary to have a good staff of instructors, and this staff must be not only large enough in point of numbers, but should be composed of the best men procurable for the particular work.

Now what is the condition of the gymnastic staff of the army in India, an army to which physique is everything. I have already given its strength, *viz.*:—two officers, four chief Instructors and 12 staff, or assistant Sergeant Instructors, exclusive, of course, of the regimental Instructors of whom there are, to each British infantry regiment three, to each British cavalry regiment two and to every division of three batteries of artillery two (or to two batteries one) and these two officers and 16 Instructors have to carry out the training of a larger number of men than that for which a staff of 16 officers and 61 Instructors (exclusive again of regimental Instructors) is considered, and found necessary, at home. In making this statement I shall probably be met with the objection that there are only 72,300 British troops in this country as against 124,775 at home, omitting in each case Royal Engineers, staff departmental corps, and others to whom instruction is not imparted, but to the 72,300 British troops have to be added the native army, which of late has taken up gymnastic training very keenly and for which trained Instructors have to be provided. Now the chief duty of the gymnastic staff is that of training non-commissioned officers for regimental Instructors, the supply of which has constantly to be replenished owing to men becoming time expired &c., and for seven months out of the year the work of the staff at the four central schools is very severe. As more and more interest is taken in gymnastics and the great benefit derived from them is more fully realised, the number of men sent to qualify as Instructors becomes yearly greater, and the strain on the Instructional staff, of course increases in proportion. During this last winter no less than seven officers, 101 non-commissioned officers and 18 privates from British corps in the three Presidencies passed through a special course of instruction at the four Central training schools, and 99 non-commissioned officers and men of the native army were passed out as trained Instructors, though a very much larger number went through the course.

Bearing in mind that during the six or seven months that constitutes this special course, not only are the men attending it put through a most complete series of gymnastic exercises, and brought to a very high state of training, but that each individual is instructed in fencing, swordsmanship and the use of all arms, it will be perceived that the number of Instructors is quite out of proportion to the work required from them. Much has been said lately about swordsmanship and the science of fencing, and in a lecture lately given by Captain Hutton, at the U. S. Institution in London, some rather severe remarks were passed by him on the system of fencing taught in the military gymnasias, particular exception being taken to that method of imparting instruction known as "class lessons." No one, who knows anything about the subject, will question the correctness of his views in this particular, and where a man has to learn, in from six to eight months the main principles of a science that takes a life-time to master, it is manifestly necessary that he should receive a very large amount of that individual attention which cannot be given him if he forms merely one out of a class of from 10 to 15.

That so much has been done, under the circumstances, redounds greatly, I cannot but think, to the credit of the gymnastic staff, and says much for the manner in which it has worked; but a marked deterioration in the class of men sent to qualify as instructors has of late manifested itself, which will of course, add very materially to the difficulties of instruction, and may necessitate either the passing through at the yearly examinations of less efficient men, or the total rejection of many, whereby the vacancies occurring amongst the regimental instructors will be unable to filled. This deterioration I attribute chiefly to the indifferent status held by the gymnastic staff and the want of inducement to good men to come forward. This want of inducement is of course comparative with the advantages held out by other branches of the service, but a glance at the position of the different grades of instructors will speak for itself.

First comes the four chief instructors. These may be said to be the back bone of the whole system, for the immediate supervision over the training of the non-commissioned officers sent to qualify as instructors, who afterwards return to their regiments and impart to others the knowledge acquired, rests chiefly with them. They are all picked men specially selected on account of their physique, their skill, their good conduct, their educational qualifications and their general excellence. Their position may be said to correspond with that held by a Sergeant-Major of a regiment, but their treatment is very different. Two of these at present enjoy warrant rank under the provisions of the Royal Warrant of 1881, but on their retirement all warrant rank in the department ceases, and in future all chief instructors are to enjoy the status of Quarter-master Sergeant only. So poor are their prospects that non-commissioned officers holding these appointments are constantly being allured away to the Transport by its greater attractions in the shape of warrant rank and pension. It will be difficult in future to retain chief instructors, for the appointment will merely be made a stepping stone to that warrant rank so readily offered to superior men of this class by other departments, and unless their position is improved either inferior men will have to be accepted to fill this post, or the present constant change recognised at the cost not only of the department but of the service in general.

The position of the staff, or Assistant Sergeant Instructors, (12 in number) is equally unsatisfactory for the following reasons. Their regimental promotion stops on their being appointed to a Central Gymnasium and no matter how long or how well a non-commissioned officer may serve in the appointment, he only draws in addition to the staff salary of Rs. 18 per mensem, the pay of the rank he held on leaving his regiment. Though given the local rank of Sergeant, no clothing or badges to enable him to keep up this rank are supplied him, and he is liable to compulsory reversion to his regiment should it move to another Presidency. His position is in every way inferior to that of the regimental instructors, for whose training he is responsible, and his general status being thus so indifferent, much difficulty is experienced not only in retaining good men, but in filling vacancies which occur. That

regular gradation in rank which should exist amongst the whole staff of gymnastic Instructors, (whereby a man could go from assistant regimental to regimental, regimental to staff, and staff to Chief Instructor,) is moreover rendered impossible, and at the present time, beyond the chance of appointment to chief Instructor, promotion in the department is non-existent. Were these staff Instructors given a better status and made supernumerary to their corps, as at home, a far superior class of men would be obtained, the army generally would benefit, and that discontent and feeling that the Gymnastic department has but little to offer, the existence of which is a great danger to its efficiency, would be entirely removed.

As regards the regimental Instructors, their status and pay are both good, but the constant promotion to colour-sergeant of these specially trained men, so promoted because they are generally the smartest men in the battalion, deprives the army of many of its best Gymnastic Instructors. In nearly every case they have informed me that they would prefer to remain as regimental Sergeant Instructors but they cannot afford to refuse the promotion offered them owing to the better pension which is attached to the rank of Colour-Sergeant. To remedy this I would suggest that "regimental" Instructors be given the rank of Colour-Sergeants in the same manner as the Fencing Instructors in the cavalry hold the rank of Troop-Sergeant-Major, the rank to carry no additional pay, but to entitle the holder to Colour-Sergeant's pension on discharge.

I have alluded thus somewhat lengthily to the general status of the Instructional staff, as distinguished from the regimental Instructor, because it appears to me that this staff is the key of the whole system, and that not only should every inducement be held out to good men to come forward, but also that when obtained they should be content to remain.

It is to the Instructional staff at the four central schools that we must look for that education in the use of arms so necessary to all ranks, and when it is remembered that the Fencing Instructors of the cavalry, in which branch swordsmanship is of such great importance, are trained by this staff, it will be seen how important it is that the best men possible be secured.

You will all remember that very able and excellent lecture delivered in this institution last year by Colonel King-Harman on "Officers and their weapons," a sort of second edition to which was given in the London Institution by Captain Hutton under the title of "Our swordsmanship." Both these lectures have, I am glad to say, not only had the effect of calling attention to the ignorance of our officers in the use of their swords, but have also aroused a general interest in "*les armes blanches*." It would be a great pity to allow this interest to die down, and the present certainly seems a most favourable time, except perhaps from a financial point of view, for the introduction of some defined and practical system of instruction amongst our officers. Some such scheme as the formation of "Schools of instruction in swordsmanship," where officers could, at least, acquire the main

principles of attack and defence and be taught to so handle their arms that they can not only protect their own valuable lives but disable their adversary, appears absolutely necessary; for although it is, of course, impossible to make every officer an expert swordsman, he should certainly be able to ward off any attack made by an ordinary adversary, no matter with what description of weapon the latter is armed; and this brings me back to the Instructional staff again for a few minutes.

In the lecture by Captain Hutton, already alluded to, it was implied that but very slight knowledge in the use of the foil or sword could ever be acquired from an Instructor in a military Gymnasium, owing to the want of proficiency in the Instructor himself, but I believe that if the present disadvantages under which our Instructors labour were removed, we should be able to obtain as sound and as good instruction as is imparted to the officers of any other army.

The French take three years to make a *maitre d'armes*, and it is manifestly absurd to expect our Instructors to be complete "masters of fence" in six months practising two hours a day, but by retaining the same staff of instructors in the central schools for several years, they could be continued in their education, and the rudimentary knowledge acquired in the first six months developed, until from constant and prolonged practice they would be capable of imparting a thoroughly practical system of instruction to even the most advanced pupils. Some of the old Aldershot fencing instructors were a clear proof of this, and I remember that when the English Gymnasts first went to Sweden in 1882, these instructors easily defeated the best Swedes. With the present constant change it is impossible to obtain a high standard of fencing amongst the instructors, and although their Gymnastics and general knowledge in the use of the bayonet and sabre leave little to be desired (in gymnastics I believe them to be far in advance of any thing to be found outside a military Gymnasium,) I am forced to admit their play with the foil is open to improvement.

Whilst on the subject of swordsmanship I should like to make one or two remarks with reference to the weapon with which our officers are armed. It is customary to say that "A bad workman finds fault with his tools," but a bad tool is sometimes responsible for a bad workman, and if everything depended on the man and nothing on the implement, we might as well have left our soldiers in possession of the old Brown Bess. Colonel King-Harman said a good deal that was very pertinent concerning the first half of the heading to his lecture, *viz.* "officers," but I do not remember that he told us much about the second, "their weapons."

As I was not brought up a practical sword maker I do not propose to lay down any rules for the manufacture of these articles, but I should like to call attention to a few radical defects in our present swords, which defects would serve to handicap the finest swordsman. We will first take the guard and hilt. This is generally now what is known as the "half basket," whereby the outside of the hand, or knuckles, are protected by a good deal of metal, and the inside, or thumb, has practically nothing. The result of this excellent arrangement is that the sword is much heavier on one

side than the other, and when a cut is made the edge of the blade has a natural tendency to turn, and half the effect of the cut is lost. The thumb moreover is insufficiently protected whilst the knuckles are unnecessarily covered, and as the former is absolutely indispensable to the grasp of the sword it would seem expedient to provide against its loss. In a claymore the foregoing defects are non-existent for it has a "basket" hilt, with the weight evenly distributed on both sides, and if the blade of this weapon was made a little more in proportion to the weight of the guard, as in all old claymores, and a proper handle fitted on the tongue it would leave little to be desired.

In the old swords, whether heavy or light, it will be found that the blade is fixed in the centre of the guard, and that the weapon is evenly balanced. The guard itself is also much lighter than in the present swords, and its weight is in due proportion to that of the blade. A common and most useful guard was that consisting of a round steel plate (or disc) fixed where the forte meets the hilt, with a semi-circular bar connecting it with the pommel. This was both light and strong, and was ample protection to the hand. If we go back to the days when fire-arms were not, and hand-to-hand fighting was general, we find that the swords then had only a cross bar separating the blade from the hilt, as in a dagger, and this seems to have been sufficient, though I would certainly recommend more.

From the guard we naturally come to the hilt, or handle of the sword. This is now made round or nearly so, and consists generally of a piece of wood fitted over the tongue, covered with fish skin and bound with rows of wire to give a ridge and furrow surface. The whole is kept together by the end of the tongue being rivetted on to the pommel, but in many cases it is so loosely fastened that the whole handle "wobbles" about, and a good steady grip is impossible. The hilt of a foil is always made square, whereby a splendid hold is obtained, and this form should, I think, be adopted in all swords, the four corners or angles of the square being of course rounded off. The "tongue" should be of sufficient substance and size, not only to give the necessary strength but also to ensure a firm and steady grip, which cannot be obtained if it is only a narrow tapering piece of metal; and the whole hilt should be so rivetted together that it is impossible for any portion of it to become loose or displaced.

Now as regards the blade. It should be of sufficient weight to enable a bayonet thrust to be parried with ease, and should be so constructed that it is suitable *either* for cutting or pointing, but its shape, length, and breadth should depend upon whether it is intended for a mounted or for a foot man. If for the former a longer, slightly heavier, and more curved blade would seem the best, whilst for the latter a length of from 30" to 32" is amply sufficient provided it has the requisite weight and strength. But to obtain the latter it appears necessary that a different form of construction should be adopted from that now in use. The plan of making sword blades with a broad groove, or concave surface on each side, seems a faulty one, and I have never yet tested a blade made in this fashion that has not broken in half. Our gymnast

sia "practice swords," one of which I have here, are made thus, and although supposed to stand the very roughest usage, are perpetually breaking. This is the form in which the blade of the new regulation sword, a weapon which for general faultiness of construction appears unique, is made, and it is not clear why the lines on which the best swords of old were constructed, *viz.*, tapering from centre to edge, are not adhered to. When a cut is made there is not only the resistance of the object cut at, but also the resistance offered by the sword itself when passing through the object, and any one who has tried cutting a good 80lbs. English sheep in half, knows how much depends upon the description of sword used. Where the object cut at is of a hard nature, such as lead, it does not matter much what shape the sword is (provided it has a "chisel edge,") as the cut made by the stroke of the sword "gapes" out, and there is but little friction; but with a body, the object against which a sword is supposed to be used, the flesh has a tendency to cling round the blade and impede its passage, and the broad groove down the centre of each side only adds to the resistance, for the soft flesh and fat seem to fit into this groove and obtain a sort of a grip. I have seen a good many Andrea Ferrara blades, and every one was made tapering slightly from centre to edge. As the forte of the sword is that part which should be used to parry an advancing weapon, from 8 to 9 inches only of this portion of the blade, measuring from the hilt, might be quite blunt with an eighth of an inch edge, but the remainder should, I think, be double-edged and suitable for either cutting or pointing. In the new sword the forte is made blunt, but the rounded edge is carried up too far, and it is impossible to deliver a cut with this weapon. This is a great mistake, for although no one will dispute the effectiveness of the point, there are many occasions when the cut is both advisable and more useful. For an infantry officer a long sword is, I think, a mistake, and a total length of 3 feet, from pommel to point, seems ample. More substance could then be given to the blade, and the leverage being less, the power of guard and facility of point would be greatly increased.

The naval cutlass, which is very short, has been shewn to be most effective in the hands of our blue jackets, but here again we come on physique, for our sailors are in a chronic state of gymnastics. * * *

From the sword we naturally come to the bayonet, and if it is expedient that our officers should be able to use the former, it is certainly necessary that the soldier be instructed in the use of the latter.

During my last winter tour of inspection I was particularly struck with the great want of knowledge in the use of the bayonet shewn throughout nearly every infantry regiment. With the exception of possibly a dozen men in each, who compete in the annual assaults-at-arms, there were none who possessed the most rudimentary skill in the use of this weapon. Many people maintain that the days of close fighting are over, and that both the sword and the bayonet are to all intents and purposes obsolete weapons. But I do not think a statement of this sort is borne out by facts, and we have only to look at what took place in the Zulu war, in Egypt, in Burma, (and at such engagements as Maiwand

and MacNeil's Zareba), to be convinced that the bayonet has still its uses. You probably all know the opinion of Prince Kraft, as expressed in his letters on infantry, both as regards gymnastics and the bayonet.

Of the first he sums up—"With strength grows self-confidence, "with self-confidence courage. He who is skilled knows it; he who "knows it, presses on."

Of the latter he says—"We do not teach the bayonet in order that "infantry may rush in on arms of precision with the bayonet alone," but "that the soldier may not fear a fight with the bayonet, may feel "himself secure so long as he has his bayonet on his rifle, and may hold "the certainty of *Victory in his hand*." After commenting on the moral effect of the bayonet he goes on to say—"He who has not made "up his mind to come at last to the bayonet can never win, for he can "have no serious intention to assault. *He who does not know how to "use his bayonet* will certainly not be determined to finally attack with "it, and thus he will never make a serious attack." Not long ago a distinguished officer remarked to me that, "If a soldier could hold his bayonet straight, that was all that was necessary," but I think that we want a little more than this. I have heard some people argue that musketry, as now taught, is waste of time, and that all that is required is to teach a man to hold his rifle parallel to the ground. There is no accounting for opinions any more than for tastes. The bayonet exercise is of course taught in all regiments, but this exercise is simply a drill, and although of certain benefit in teaching a man to handle his arm and in accustoming him to its weight and feel, it is of little practical use. You cannot teach a man to shoot game by showing him how to hold his gun only, neither would he learn to swim or ride by merely going through the motions. Practical demonstration is absolutely necessary to skill in anything, and a man might spend his whole life on the barrack square, and never learn to protect his own body or damage that of his enemy. There are few exercises more beneficial or more interesting and exciting than those of "bayonet v. sword" and "bayonet v. bayonet" or "lance." They bring every muscle of the body into play, they quicken the eye, the hand and the legs, they are excellent for the limbs, and they act upon the whole system. If there is any officer here with a liver let him go into the gymnasium, take a spring bayonet, have 20 minutes with the Instructor, and judge for himself.

I have always found that the men are keen enough and only want encouragement, and I cannot but think that if company competitions with this arm were started in regiments, and the best men of companies fought off for a regimental prize, great results would ensue; or the practical instruction might be introduced as part of company military training. In one regiment I found something of this sort to exist, and the skill displayed by the men of that corps was in very marked contrast to what I witnessed in so many others. To carry out a practical instruction in the use of the bayonet, however, it is absolutely necessary that each regiment be supplied with a certain number of spring bayonets. At present six only are allowed to a battalion, but this number is quite inadequate to the requirements, and it should be at least doubled, and the

practice swords increased from two to six. As the lance is in such general use now, at least four of the weapons should also be issued to every gymnasium, so that some practical instruction regarding them may be imparted to the infantry soldier. The cavalry schools of course have them, but I do not think that the use of them when dismounted is much taught, and as a man might at any time find himself without his horse, and with only his lance to depend upon, he should undoubtedly be instructed to handle this weapon with some skill when on foot.

With regard to the actual training as carried on inside the gymnasium, this I think leaves nothing to be desired. The course as previously stated, is so arranged that whilst the body is developed and the muscular power increased, the use of the limbs is fully taught, and if only more men were sent to be instructed, and when sent were not withdrawn for other duties, this part of the physical training of the soldier would leave little to be desired. During the year ending 31st March 1893 over 16,000 men were instructed in gymnastics in the three Presidencies, or about one-third of the whole British force; but more than this might be done, and I do not myself see why every man in a regiment, under thirty years of age, should not be put through a course of gymnastics yearly, which could easily be done if more classes were detailed to attend daily, instead of only the thirty duty men and perhaps thirty recruits, so usual at present. I am, of course, alluding to those stations where covered gymnasia exist. At home the instructors in a gymnasium take four classes a day, besides voluntary work in the evenings, and there seems no reason why three classes of 30 men each should not attend out here. I am alive to the difficulties arising from the multiplicity of duties required from the soldier now-a-days, and "musketry and military training" has become a stock "reason for withdrawal from course" in the Regimental Gymnastic returns, but I think with a little dovetailing more might be managed, and with 90 men attending daily, a battalion could easily be got through in the year, the courses being regulated by the number of attendances rather than by time. These attendances should be not less than 30, they should be continuous, and of a full hour and a half duration each. With five days a week the course could be completed in a month and a half, guards being performed on Thursday and Sundays. The continuity of the course is of great importance, and men, once detailed, should not be withdrawn even for a day.

I was agreeably surprised to find during my last year's tour how interested in Gymnastic training most Commanding Officers are, but I regret to say that there still remain a few who assign to this most important part of a soldier's education a very secondary position, and carry on instruction, as it were, "under protest," giving as an excuse that there is so much to do now, and that musketry, military training, garrison duties, &c., *must* be performed; thus implying that the physical training of the men can be neglected.

The regulations with regard to musketry and military training being so clearly defined and stringent, it is perhaps natural that these two subjects should at present occupy the first place when considered with

Gymnastics, but I trust the time is not far distant when the formation of physique, a want of which renders all other instruction *useless*, may be assigned a position not inferior to other portions of a soldier's education. I am convinced that if more help and *encouragement* were given to commanding officers to carry out Gymnastics and the use of arms, a very marked improvement in the health of the men would manifest itself, and that although the initial cost of supplying the additional apparatus and stores so urgently required might be considerable, the outlay would be more than recovered by the saving in hospital expenses, in loss of life, in "non-effectiveness," and in all that constitutes "waste," to say nothing of the gain in efficiency and the increase in power by making one man able to do the work it now takes two to accomplish. And in calculating the benefits likely to ensue, we must remember that not only the compulsory but the voluntary attendance of the men has to be considered.

What is the life of the ordinary soldier in cantonments? I don't mean of the minority who are naturally energetic, have athletic tendencies or are studiously inclined, but of the large majority who spend their time, when off duty, how? You all know as well as I do. Is it a healthy life? Is it conducive to that general fitness and power of endurance which should characterise the soldier? Are long hours of idleness and *ennui* varied by frequent visits to the canteen, by intervals of heavy slumber, and by time spent in a dirty bazaar, the training best fitted to make a man all that he should be? Regimental institutes have, of course, been a "boon and a blessing" to the soldier, but the occupation for his leisure they provide is of a sedentary nature, and for men in the vigour of life, well fed and obliged to keep regular hours, something more than this is required. An outlet to superfluous energy *must* be supplied, if it is not, one will be created without regard to consequences. A man cannot sit in a regimental institute all day, and if he did, it would not do him much good beyond keeping him out of mischief for the time being. He may of course, try to play football or cricket, and the former is wonderfully popular at present, but it will be found that both these games are confined to a limited number, and are not indulged in by the majority of a regiment. Every Englishman, I believe, likes using his limbs in some form or other, and the more "forms" he has the better. There is none so suitable to a soldier in a country like India as a well ventilated covered Gymnasium, and a building of this kind would, I am convinced, if properly lighted, be full every evening between those hours when a man never quite knows what to do with himself. But the officers must encourage the men to attend, and show that they take an interest in all that pertains to the Gymnasium. The soldier takes his cue from his officers, and if the latter takes up any particular line in earnest the former very soon follows suit. We see this in certain regiments in which musketry and football are "gone in for," and I found during my last winter's tour of inspection a most marked difference in physique and activity in those few regiments in which even one or two officers personally visited the Gymnasium, and not only performed exercises themselves but encouraged the non-commissioned officers and

men to try and excel at all feats of activity and strength. When I was superintendent at home I have seen the Gymnasium so well attended voluntarily that it was necessary to make special arrangements to admit the men by batches.

I have said that the course of training carried on inside the Gymnasium leaves little to be desired, but as a second part to this course are those further exercises in physical training which should be taught outside, and which, although not Gymnastics in the generally accepted use of the word, are certainly such according to Dr. Webster, who defines Gymnastics as, "the art of performing athletic exercises." I mean marching, running, the surmounting of natural and of artificial obstacles in "field service" order, and such other things as conduce to increased mobility. So much has been written about marching that there is little to be said. (It was only quite lately that Sir Donald Stewart called attention to this important subject, so I will only venture to offer a suggestion in regard to its practice as part of the soldier's physical training, *viz.*—That immediately after a class (the larger the better) has completed its 30 attendances at the Gymnasium, when the men's muscles have been developed and their limbs are in good working order, it should undergo a course of marching, commencing the first day with 5 miles and increasing the distance every day by one mile until 25 miles has been accomplished, which would occupy three weeks exactly. The marching to be done under conditions similar to those "on service." By degrees the whole battalion would thus be practised, and the great question of "boots," their fitting or not fitting, would also be determined. Running might be carried out in a somewhat similar manner, and should certainly be done with arms and equipment, and not in shirt sleeves as is so usual at present. In every regimental "lines" an obstacle course of a mile long should, if possible, be constructed, the obstacles on which should be of every description and size, and over these the whole regiment should be exercised once a week in any formations considered advisable, these formations being varied from fire-sections to half-companies, companies or larger units, the men advancing as if to the attack and the whole thing being made as real as possible. The men should be taught to help each other when in difficulty, and to surmount obstacles by means of "mutual support," it being impressed upon them that the quicker they can advance the shorter time they will be under fire, but they must of course be sufficiently fit to use their arms at the end of the advance.

A very great deal of all this Gymnastic training might be done at the hill stations during the summer months, when the men there have little or nothing to do, and some strain thus taken off the winter, when so much is expected from the soldier out here. But at present many of these hill stations are only supplied with some miserable out-door apparatus, of little or no good, and thus much valuable time, in which the physique of the young soldiers sent to the hills might be immensely improved, is lost. A most suitable building can be erected for Rs. 3,000, and it certainly seems penny wise and pound foolish to grudge this outlay.

Before concluding I should like to allude to two branches of the service out here, *viz.*—the Royal Artillery and the Native Army.

With the Royal Artillery in India Gymnastic training is not compulsory, as it is considered that the men obtain sufficient physical exercise in the performance of their daily work, and also because they are so fully occupied that there is no spare time left. I notice, however, that there is a good deal of difference in batteries, and some who are keen in this particular, manage to carry on a good deal of instruction. It is, however, more to the use of the sword that I wish to call attention. This does not seem sufficiently taught, and I think but few artillery men have any idea how to protect themselves or indeed to even handle the weapon properly. If the gunner is to depend on his gun altogether, why hamper him with a sword? If he has a sword he should be able to use it, to use it he must be taught, to be taught practically he must be supplied with the necessary stores. When I say that a battery is allowed two foils, two practice swords, and five single sticks as a first issue, it will be seen that not very much can be done under existing circumstances.

With regard to the Native Army, the interest being taken in Gymnastics is wonderful, and I am inundated with letters from commanding officers asking for instructors or to have men trained as such. The sepoy himself is very keen, and nearly every native regiment has erected some sort of apparatus and obtained a certain amount of stores. But all has to be done from private sources, and I call attention to the matter in the hope that some officer here belonging to the Staff Corps will get up and state the difficulties under which any sort of instruction is conducted. Forty natives are now received at each central school annually to be trained as instructors, but a great effort has to be made to do this, and beyond training these instructors the Gymnastic Department can give but little help.

Every district now has its Annual assault-at-arms, which does much to encourage emulation and skill in military and manly exercises, and the reports from the General Officers Commanding all bear witness to the satisfactory results of these meetings and to the keen interest taken in them by the troops. But there are two points in these annual competitions to which I should like to draw attention. First, the very small number of entries for the officers' events, and secondly the practical confining of the men's events to a limited few. With regard to the former it is much, I think, to be regretted that more officers do not come forward on these occasions to compete, and by their presence and example give that encouragement to their men, which in a previous part of this lecture, I have said is so much needed. With regard to the latter, some alteration in the manner in which the men compete is, I think, required. At present these meetings have a tendency to bring out only a very small number from each regiment, and the same men come forward year after year. The winning of events in an Assault-at-arms is not necessarily a proof of excellence and skill in a regiment, and I am afraid there is an inclination with some corps to work up about a dozen picked men and to neglect the others. On looking over lists of prize winners I have noticed a singular repetition of the same names, which names curiously enough are nearly always those of Gymnastic instruc-

tors trained at the central schools. Of course for certain events instructors are barred, nevertheless they generally have some pet pupils whom they have taken in hand and who are practically nearly as good as themselves. As the fair average skill of the many rather than the excellence of the few is what is desired, I think every endeavour should be made to bring men out, and instead of allowing a certain skilled few to compete time after time, company, troop, or battery competitions should be held previous to every Assault-at-arms, in which the ties should be most carefully fought off, *every* man being encouraged to enter, and then the best men of each company, troop, or battery again fought off for regimental representatives.

Although excellent in themselves and an admirable adjunct to physical training, there is a danger of both Assaults-at-arms and football competitions losing their undoubted value by becoming a sort of "ring," and being regularly so to speak "farmed," and I am informed on excellent authority, that in some regiments professional football players are enlisted under special conditions, and the regimental team given special privileges and excused many duties.

In the Gymnasium it is the weak and awkward men who are looked out and to whom additional attention is given, and it must be remembered that until a man begins to feel his strength and has gained some self-confidence, he is generally backward in coming forward, and must be searched for and taken in hand.

"Take care of the pence and the pounds will take care of themselves."

Look for your weak men, the strong will look to themselves. "With strength grows self-confidence, with self-confidence courage. He who is skilled knows it; he who knows it presses on." Never were truer words said, and all who have strength and health must know this, but to some strength has not been given, and to nearly all it is given, like the intellectual qualities, in an undeveloped form. How often do we hear the expression, "He does know how to use his strength?" And how often do we see a big hulking fellow knocked out of time by a man half his size, who has been taught to use his limbs?

It is to the Gymnasium chiefly that we must look for that full development of the physical being, so necessary not only to mental culture, but to success and happiness in life, and I am convinced, not alone from my own personal experience, but from the careful observation of many years, that there is no description of exercise so beneficial in every way as Gymnastics, for there is no part of the body that they leave untouched, no muscles or organs that they do not bring into play.

Cricket and Football are, of course, magnificent games, which owe their popularity largely to the open air in which they are played. Combined with the Gymnasium they should indeed make a man fit, but by themselves they can never have the same effect on his physical being as Gymnastics, and whereas football has to be given up early in life, work in the Gymnasium can be continued to almost any age.

To parody the well known verses of Whyte Melville.

There is but one cure for all maladies sure,
That affects both the weak and strong.
It is the work of the Gym. on both body and limb,
Whose benefits last for so long.

In these days of urban populations and the survival of the least fit, it is more than ever necessary that no efforts be spared to improve the manhood of the nation; and in the army particularly, which has to undergo hardships not entailed on the civil population, should these efforts after improved physique be made.

The grudging recognition of the value of Gymnastic training in this country is in marked contrast with the attention paid to musketry. No one would question the soundness of the late Commander-in-Chief's views as to the paramount importance of assiduous practice at the butts and in all that pertains to efficiency in rifle fire; and yet all the skill acquired in the use of the rifle will be of no avail, if he who possesses it be physically unfit to bear the tremendous strain of active service. The appliances which experience has taught to be best adapted for improving the soldier's physique should be provided on a more liberal scale; endeavours should be made to wean him away from the attractions of the bazaar by giving him increased occupation for his leisure hours and a means for working off his superfluous energy; the practical use of all weapons should be more fully taught, his dress should be made more suitable to complete freedom of limb; and he should receive every encouragement from his officers (most of whom rarely go near a Gymnasium at present) to endeavour to perfect his physical being and maintain himself in sound health.

Gymnastics and the use of arms should be as carefully inspected as any other part of a soldier's training. "That which is inspected will be practised" (to quote Prince Kraft again), and like "the chain of responsibility," the chain of interest, and consequent increased proficiency, in any particular branch of the soldier's education, passes through all ranks from the highest even to the very lowest. Each man takes his cue from the one above him and acts accordingly.

If this lecture, and the discussion which I hope will follow it, succeeds in arousing an increased interest in a subject so deserving of attention, I shall be more than satisfied. It is chiefly in view of a discussion and the consequent obtaining of different opinions, rather than to air my own ideas, that I have trespassed on your time so long, and I can only regret that some one better able to do justice to so important a subject as "Army Gymnastics" was not forthcoming.

DISCUSSION.

COLONEL M. J. KING-HARMAN :—After the admirable lecture which we have just heard, and which will soon be published throughout India and the United Kingdom, I earnestly hope that some decided steps will be taken to improve the physical training of the whole of our army in India.

Our army being so small in comparison with the enormous extent of territory and the enormous amount of wealth which it has to guard, ought to be an army of athletes, in which every officer and soldier is a perfect master of the weapons with which he is armed ; and this could easily be accomplished, if the very moderate proposals made by the lecturer were carried out. Our army, I refer now to the British portion of it, is the most expensive in the world, but is it the most efficient ? Does the nation get full value for the money that is spent on it ? Are the officers hardy, active men, and perfect masters of their weapons ? Are the men, every one of them, physically fit to undergo the hardships of a campaign ? Are they renowned for their powers of endurance and for their skill in the use of the bayonet ? If not they should be.

We pay the greatest possible attention to musketry, and spend more money on it than any other nation does, because we thoroughly understand the value of good shooting, but we do not seem to understand that there is no use in a man being a good shot in cantonments, unless he can be brought up to the point of contact with the enemy in such a state of fitness as to be able to make full use of all the instructions he has received.

Practical physical training, including the use of weapons, Gymnastics, running, and marching, such as is recommended by the lecturer, is all that is required, and yet that is what is most neglected. We are told that more covered Gymnasias are urgently required, and that a suitable building can be erected for Rs. 3,000, or ten for Rs. 30,000. That is not a large sum when we consider the immense amount of good that might be done with it ; but we are a curious nation and most conservative in our ideas, therefore I believe that at the present moment we would sooner spend the money on a hospital, and on nurses for the treatment of the men who become sick for the want of those very Gymnasias. But in a year's time our ideas may have changed.

It is a fact, and one of which we should be, but are not, ashamed, that in many important respects our army is far behind that of many others nations ; and the worst part of it is that there is no reason why we should be behind any of them, for in our officers and men we have finer material to work upon than will be found elsewhere, but we do not make proper use of it.

I fully agree with what the lecturer has said about the difficulties under which physical instruction is imparted to the men of the Native army, but at the same time I feel sure that he would be astonished if he knew the amount of work that is done in some regiments, in the way of voluntary athletics, and sports that are got up and kept going by one or more of the British officers ; and I cannot help thinking that more real work of that sort is done in the Native than in the British portion of the army, but the assistance derived from the State is next to nothing.

The lecturer has been good enough to allude to the paper I read here last year in terms of praise much higher than it deserved. I only wish that he had been here in my place. My shot was ill directed and missed the mark, but his has I think gone straight home, and is bound to produce the most valuable results.

Our army is now the best instructed as far as book learning and musketry are concerned, and it only requires more physical training of a practical nature to render it invincible. Gymnasias are wanted, and Instructors are wanted of a higher standing than those now employed, and in much greater numbers.

The money *must* be forthcoming, and if necessary should be diverted for the purpose from matters of less urgency and importance.

If I said too little last year about the new infantry sword, it was because I had not then seen one of them. My opinion regarding it is that it is merely a grotesque caricature of the original sword that was made for me by the Wilkinson Sword Company in Pall Mall, and that it is about the worst weapon that could have been devised: that, however, is entirely the fault of the ignorant people by whom it was designed, and the sword outlers are in no way to blame, as they are obliged to make according to the shape and specifications that are given to them.

I entirely agree with the lecturer regarding the supply of muskets with spring bayonets, which is quite insufficient, but at same time I doubt if full use is made of those that are now supplied, which I expect are chiefly used for the instruction of a few specially selected men.

LIEUT.-COLONEL H. GUNTER, Commanding 1st Battalion Norfolk Regiment:-- I think we owe much to Major Dalzell for his excellent lecture, and I am only sorry that there are not more officers present to hear it, for although they may read it afterwards in the Journal, a lecture, I think, comes home to one more clearly when face to face with the lecturer. I wish to add my opinion to that of the lecturer regarding the superiority as non-commissioned officers of the regimental Gymnastic Instructors, and especially agree with him as to the advisability of giving to the Sergeant Instructors the rank of Colour Sergeant (without pay) after a satisfactory service of, say, five years in the appointment. Gymnastic Instruction is most essential, and in my opinion a recruit fresh from the country or a mill is unfit to be placed in the hands of the Drill Sergeant until he has passed through those of the Gymnastic Instructor: while undergoing that course he should in addition only be taught to handle his arms. I wish to ask if the 30 days annual course must necessarily be continuous, as therein often lies a difficulty with commanding officers. Musketry and military training are carried out thoroughly and efficiently, because they are done under the company officers, and every officer is anxious to have as few unexercised men as possible. In my opinion the Gymnastic training will not be complete until it forms part of the Field Training of a company. The spirit of instruction in Musketry and Field Training is to spread the course as much as possible over the year. The same might be done with Gymnastics. Once a soldier has been thoroughly instructed by going through a recruit's and trained soldier's course, an annual course might be arranged to fit in with the course of company Field Training, getting rid of some of the routine such as weighing and measuring by the medical officer; which cannot be of any advantage except in the case of a class of recruits or young soldiers under two years service. The class may lose some proficiency by the 30 days course not being continuous, but the regiments as a

whole would gain by the increased number that must be trained, and by the training being continued throughout the year. Any men found wanting in the necessary proficiency could at once be sent back for a 30 days course as extra instruction for inefficiency, in the same way as a third class shot is ordered extra instruction in musketry. I beg once more to thank the lecturer for the paper he has prepared us.

MAJOR G. H. COATES, 25th Punjab Infantry:—I beg your permission, Sir, to say a few words on behalf of the Native army, to which I have the honour to belong. The lecturer has referred to the interest taken by the Native army in Gymnastics, and the difficulty under which any sort of instruction is conducted. My personal experience with a Punjab regiment, extending over many years, (several of which were passed as Adjutant), enables me to confirm fully all that has been said on this point. The keenness of the sepoy to qualify himself in Gymnastics is more noticeable every day, and is practically demonstrated by the large number of candidates (at all events in my regiment, the 25th P. I.), who come forward for instruction at the Gymnastic centres. Owing to the limited number that can be admitted to these centres, a very small selection has to be made, and so keen is the competition, that men for whom no vacancies exist, regard their rejection almost as a personal insult! Now, with reference to the apparatus and stores, these are, in the Native army, supplied privately by regiments. This comes hard on a regiment, and I trust I may be allowed to plead for Government assistance for the Native army. We do not expect to be treated the same as British troops, but it would be a very great help to us if we were given, even what I might call an "initial" supply. Give us good and sufficient apparatus to start with, and I am certain we would only too gladly keep it up. We cannot hope for a regular Gymnasium, but some sort of a covered-in place where the men can resort would not cost much, and would do a good deal towards encouraging and developing Gymnastics in the Native army. The lecturer has referred to an obstacle course, and I would like to take this opportunity of remarking, that Colonel Smyth, commandant of my regiment, has at great pains and entirely at regimental expense and with regimental labour, recently constructed one in our lines at Sialkote. The course is about $\frac{3}{4}$ of a mile, and comprises many and varied obstacles. I need not go into detail as to their description, but suffice it to say, they are fairly stiff, instructive, and a good test of the men's capabilities. This course is run over once a week by the entire regiment, and takes the place of the weekly route marching prescribed for regiments in the Rawal Pindi District, and the men prefer it to route marching. It was first started as a purely voluntary exercise, and when I state that, with the exception of a few men temporarily unfitted from various causes, to undergo a strain of this description, the regiment as a body voluntarily go round the course, I do not think any greater proof of the keenness of the men for Gymnastic exercise need be adduced.

Surgeon Major-General BRADSHAW remarked that the subject of the lecture was of great interest to army medical officers, as gymnastic exercises not only develop and strengthen the muscular system of the

younger soldiers in particular, but by inducing freer play of the vital energy in the body in general raise the standard of the health of the individual and improve his constitutional power of endurance under stress of military duty,

The lecturer having adverted to the points of medical bearing, it need only be observed that it is unquestionably most desirable that covered gymnasia should be numerous established, be opened after dark and be well lighted to attract men to pass their evenings there in salutary recreation instead of haunting bazaars, where great risk is run of catching enteric fever to which young men are so liable, or other complaints which often do lasting injury to the constitution.

The lecturer adverts to the influence which regimental officers have constant opportunities of exerting over their men. I am satisfied that the health of soldiers really depends very much upon the squadron, battery or company officers. Those who, being sensible of moral responsibility for the welfare of their men, display earnest and sustained interest in them individually, encourage sports, athletics and proper occupation of time, wean the men from drink and dissuade them from unnecessary visits to the bazaar, will be well rewarded by lessening of the sick list, by increase of soldierly efficiency and by personal attachment aroused.

It is to be hoped it is not really the case as stated by the lecturer that troops sent to the hills for the hot weather have little or nothing to do there. To keep men idle in a good mountain climate, is very likely to result in neutralising the advantage to health of exemption from the summer heat of the plains. Their mornings should certainly, up to noon say, be devoted to enforced action, such as parades, route marching and gymnastics.

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Colonel H. S. FELTON, 16th M. I. in the Chair.

CAVALRY RAIDS.

By Major W. G. CROLE WYNDHAM, 21st Hussars.

Following the two valuable lectures given last year and the year before by Captain Lawford on Cavalry Tactics and by Captain Pilkington on the training of Cavalry for reconnaissance, the subject selected for this paper appears to be of very secondary importance. Now although we must admit that raiding is only an auxiliary to cavalry work in the field, yet it may on occasion play a most important part and the subject deserves some consideration at our hands if only to ensure that sufficient preparation is made when the cavalry is called upon for this service.

That we have had so little experience in cavalry raids is I maintain entirely our own fault and the fact that our commanders have not recognised the importance of the work that may be done by cavalry in this direction, it is not from want of opportunity. The case that I have in my own mind at this moment is the Zulu War. There we had a fine force of cavalry of which little or no use was made. The two British Regiments, the K. D. Gds. and the 17th Lancers marched up to the frontier some distance ahead of the bulk of the infantry, each regiment 400 strong and in fine condition; in addition to these there were several hundred irregular cavalry of the best description. It was proposed that the cavalry should make a raid on Ulundi, burn the Kraal and capture the King if possible; the distance was about 80 miles, the Zulu army was scattered over the country, (for they only collected their troops just previous to a battle) and at that time, early in May, the grass was still green and good feeding. Moreover the country though rough was very fairly suited to cavalry. The proposition was abandoned much to the disgust of the cavalry who were employed mostly in bullock driving and escorting convoys. I think I am right in saying only $2\frac{1}{2}$ squadrons took part in the battle of Ulundi. I believe that in the Boer War, had it not been brought to such an abrupt termination, the cavalry would

have been employed in raiding ; and it is probable that a strong force of cavalry going rapidly through the country and appearing at the besieged forts would have brought great encouragement to their defenders and consternation to the Boers.

Continental Powers keep a large force of cavalry on their frontiers ready at the first note of the declaration of war to dash across into the enemy's country and hinder mobilization by breaking up railways, cutting telegraph wires and destroying bridges. It is probable that the next campaign in Europe will open with big cavalry battles and the nation that is able to drive back and disperse the enemy's cavalry will follow it up by doing immense damage to his communications. But though there are large bodies of cavalry on all European frontiers, if they mean to go in for extensive raids at the commencement of a campaign they naturally take care to keep their plans to themselves, and one can only guess what might happen from the position of the troops. Russia alone seems inclined to practice long rapid marches with large bodies of cavalry.

The frontier stations of the German cavalry are as follows :—French frontier—Thionville 4 squadrons, Metz 8 squadrons, Dieuze 4 squadrons, Saarlbourg 8 squadrons, Colmar 4 squadrons, Mülhausen 4 squadrons, total 32 squadrons to about 170 miles. On the Russian frontier there are at Tilsit 4 squadrons, Stallupöhnen 4 squadrons, Lyck 4 squadrons, Thorn 4 squadrons, Gnesen 4 squadrons, total 20 squadrons, to 500 miles.

The Russian cavalry posted on the German frontier are at Libau 4 squadrons, Worn 4 squadrons, Kowno 4 squadrons, Mariampol 8 squadrons, Augustov 4 squadrons, Bjelostock 12 squadrons, Mlaw 4 squadrons, Wlodziawski 8 squadrons, Kalisch 8 squadrons, Konin 4 squadrons, Tschenschow 4 squadrons ; total 60 squadrons to 500 miles. On the Austrian frontier there are at Miechow 4 squadrons, Pintschow 4 squadrons, Staschew 4 squadrons, Janow 4 squadrons, Bjelgorai 4 squadrons, Tomaschow 4 squadrons, Wolinsk 4 squadrons, Dubno 4 squadrons, Krenen 4 squadrons, Kremenetz-Podolsk 8 squadrons ; total 48 squadrons to 450 miles. By these numbers it will be seen that Russia has a superiority of cavalry on the German frontier of 3 to 1. This evidently means that she is prepared for cavalry operations on a large scale directly war is declared.

It is somewhat difficult to draw a distinction between Raids and Reconnaissances. It would seem that raids are usually made with a view rather to do the enemy harm than anything else ; by cutting telegraph wires, breaking railways, blowing up important bridges, destroying his magazines and so forth to paralyse his movements and cut his communications. Reconnaissances are limited to smaller numbers with a primary view of obtaining information, though of course reconnoitring patrols will often do serious mischief on an enemy's lines of communications and raids will nearly always obtain valuable information.

Raids have been carried out with more or less success from the earliest times, but in these days of telegraph and railway there is little to be learnt from a study of raids carried out in thinly inhabited countries without these modern improvements. The American Civil War

of 1861-65 has shewn us what wonderful results may be obtained by a series of cavalry raids against the enemy's lines of communications carried out on principles suited to the Theatre of War and to the combatants.

The Wars of 1866 and 70 furnish us with no instance of raids by cavalry on either side; daring reconnaissances there were no doubt, more especially on the part of the Germans whose small cavalry patrols penetrated miles through the enemy's lines, destroying bridges, railways and telegraphs, and obtaining valuable information; but to recount these would be to go beyond the present subject. In '77 there is General Gourko's raid across the Balkans into Roumelia. With 4000 cavalry, 8000 infantry and 32 guns he captured the Shipka pass, destroyed the railway and sent his patrols nearly to Adrianople.

The advance of the English and Indian cavalry to Cairo after Tel-el-Kebir can hardly be called a raid; the object was not destruction but by a rapid movement to save Cairo from the fate which had befallen Alexandria.

It is then to the War of Secession in America that we must go for examples of what can be done by a really good raid. The first of these was General Stuart's raid in Virginia round McClellan, June 13th 1862.

On May 31st and June 1st 1862 the battle of Fair Oaks had been fought without decisive result between General McClellan with 50,000 Federal troops and General Johnston commanding the Confederate army 40,000 strong; and at the time of this raid the two armies lay facing one another in front of Richmond the Confederate capital. Notice was given to Stuart's troops three days before to prepare for work but their destination was kept secret. Starting on that morning with 1,200 men and two horse artillery guns, three days rations and 60 rounds a man, he first marched north to Ashland opposite the Federal right where he bivouacked the first night. At dawn the following morning the march was quietly resumed and the column headed east; small parties of the enemy's cavalry were met and driven off during the morning. About noon Stuart's advance guard was driven in by two squadrons of Federal cavalry; a charge down the road in column was ordered and the Federals, taken completely aback at meeting such a large force of hostile cavalry broke and scattered in confusion; one man was killed on each side. Stuart was now far in rear of McClellan's army, which lay between him and Richmond. At Tunstall's station on the York River Railway a company of Federal infantry was taken completely by surprise and captured without firing a shot. A messenger had been sent by the Federal cavalry to warn this detachment of the attack but the orderly galloped through shouting "Hell's to pay." The Confederates cut the telegraph wires and began to destroy the railway; while they were doing this a train was seen coming; General Stuart dismounted his men on both sides of the track and poured in a volley as it dashed past, killing and wounding many of the troops in the cars. A large number of horses and mules were captured here and many of the men whose horses were done up with the rapid march got remounted. They pushed on through the night southwards to Sycamore Ford on the Chickahominy river where they arrived about daylight only to find the river swollen and

impassable from recent rains ; after repeated efforts to swim the horses over only 75 were got across in two hours ; but general Stuart was fortunate enough to find a broken-down bridge and repaired it sufficiently to allow of horses being led over. About sunset they reached the James River at a point 25 miles S. E. of Richmond where a halt of two hours was allowed. The position was still one of danger and had McClellan been well served by his scouts, Stuart might easily have been cut off from Richmond. No hostile patrols were met and by daylight on the 16th the raiders were back in their own lines. In this raid 165 prisoners and 260 horses and mules were captured, the railway, telegraph and a large amount of stores destroyed with a loss of one man killed and about 20 wounded. The waste of horses was probably made up by the captures. The distance covered was 100 miles in 72 hours. The information gained was most valuable and led to the operations of June 25th to July 1st when Stonewall Jackson fell unexpectedly on MacClellan's flank with terrible effect.

This raid was quickly followed by another. On the 22nd August 1862 General Stuart made a dash round the rear of the Federal Army under General Pope posted along the Alexandria Railway in Virginia. In addition to acquiring most important information as to the disposition of the Federal Forces General Stuart captured 400 prisoners, 500 horses, 500,000 dollars in notes and 20,000 dollars in gold. General Pope himself narrowly escaped capture and lost all his private and official correspondence. But the most important of all General Stuart's raids was that made a few weeks later in October 1862 through Pennsylvania. I take the account from Col. Denison's History of Cavalry. After Pope's defeat at Manassas which followed quickly on Stuart's second raid, the Federals took up a position behind the Potomac at Harper's Ferry. Starting on October 9th with 4 H. A. guns and 1800 men Genl. Stuart crossed the Potomac on the 10th and reached Chambersburg by dark, here the telegraph wires were cut, the railway broken up and a quantity of public stores destroyed. At Chambersburg Genl. Stuart's position was very critical ; he was directly in rear of the whole Federal Army and some 90 miles from his own lines. He considered it too dangerous to attempt to return by the route he had come and decided to make a wide sweep to the east and cross the Potomac some distance below the Federal army in the neighbourhood of Leesburg. Every precaution was taken to deceive the enemy. Stuart marched first towards Gettysburg then turned S. to Hagerstown, then east to Emmetsburg through which he passed and moved towards Frederick, where the Federal head-quarters were ; turning short to the east again he marched in the night through Liberty, Newmarket and Monrovia where he cut wires and the railroad. At daylight on the 12th he reached Hyattstown, on McClellan's lines of communication with Washington, where he captured some wagons and then pushed on to Barnesville.

At that point Stuart learned positively that General Stoneman with 4000 or 5000 men was near Poolesville guarding the fords on the river. To deceive his opponent General Stuart started directly for Poolesville but instead of moving on that point avoided it by a march through the



the woods leaving it two or three miles to his left and so got into the road from Poolesville to the Monocacy. Guarding his flanks and rear, he then pushed boldly forward and soon met the enemy marching towards Poolesville. This was the first serious attack he had encountered on the expedition, and here the ability of cavalry to fight dismounted was of great service. General Stuart ordered the advance squadron to charge and the enemy's cavalry were driven back upon the Federal infantry advancing to occupy the crest. The leading brigade dismounted at once, and engaged the enemy's infantry until the artillery came into action when Stoneman's troops were driven back to the river.

Occupying the crest, which he used as a screen to cover his real movements, Stuart made a rapid dash to his left to White's Ford which was guarded by 200 infantry strongly posted in the cliffs. A few shells from the small guns and the attack of the dismounted cavalry soon drove off these enemies and the passage of the ford was safely effected. Stuart's loss was trifling while the information gained, the moral effect secured and the consternation caused in the Northern forces was of the greatest importance. His cavalry marched on this expedition from Chambersburg to Leesburg about 90 miles in under 40 hours. The importance of cavalry being able to dismount and fight on foot is plainly manifested in the skirmish near Poolesville. Here the same men charged as cavalry, drove back the enemy's horsemen from the crest of a hill and then dismounting, by their fire checked the advance of the infantry long enough to enable the artillery and the remainder of the column to come up to their assistance. The success of this raid depended, as in most raids, on General Stuart's ability to deceive the enemy as to the intended direction of his march, prevent all information reaching him by cutting the telegraph everywhere, and at the same time receiving accurate information as to the position of the enemy's various detachments. Stuart was a most efficient cavalry officer, one of the best that the war produced; his energy and impetuosity were unrivalled, while his presence of mind and promptitude of resource saved his command on many critical occasions. He was killed in 1864 while opposing with 1100 men, General Sheridan's advance on Richmond with 8000.

Another celebrated cavalry general on the Confederate side was General John H. Morgan who appears to be an example of the statement that cavalry leaders are born not made. He was the first to organize a force of cavalry which could move rapidly and fight either on foot or mounted as the occasion might require. Now in the cavalry we have no principle more firmly established than that the sword and lance, the *arme blanche* are the weapons *par excellence* of the cavalry soldier. We consider that the moral effect of cavalry charging sword in hand is under favourable circumstances very great and that the cavalry which relies on fire arms alone must surely be beaten. And there are good grounds for this belief; the history of continental wars for centuries tells of many a battle decided by large masses of cavalry. Rocroy, Naseby, Blenheim, Ramilies, Malplaquet, Marengo, many of Lord Lake's victories over the Mahrattas were practically decided by cavalry charging mounted sword in hand; many of the battles between the Turks

and Russians in 1853 were influenced materially by cavalry. Surely then we have some ground for this trust in our weapons and it will be hard to make us believe that trust is not based on sound principles.

But in America the exact reverse is the fact; the mounted men, with the exception of a small force of regular cavalry, had the greatest contempt for the sword, and it is not difficult to find the reason; the custom of almost every individual citizen being armed with a revolver and a rifle, as well as a wonderful skill acquired in their use, gave them naturally a high opinion of these weapons and a contempt for the sword. Morgan took advantage of this and revived and improved the old principle of the mounted dragoon (which has so often proved a failure in Europe,) and applied it successfully to the fullest extent. He had absolutely no military training. He originated his own method of fighting and handling men in the presence of the enemy. He organized and taught his own small mounted force, which never reached more than 4000, and is credited with having killed and wounded an equal number of the enemy and with having captured more than 15000. He was the author of the far reaching raid, as distinguished from the mere cavalry dash, and he accomplished with his handful of men results which would otherwise have required armies and the costly preparation of regular and expensive campaigns. His men were armed in a very nondescript manner; at first some had rifles, some shot guns and revolvers, but as the war went on, he captured sufficient arms from the enemy to supply his soldiers with some uniformity; the sword was hardly ever used. In his command he had two companies of specially selected scouts or spies; these men were nearly all well acquainted with the country he operated in; some little time previous to a raid he would send them out to obtain information. They went out disguised and spread over the country in all directions and brought back information as to the state of the roads, position of enemy's troops, magazines, stores, the fords over the rivers and the least known routes by which marches in the enemy's country could be made. Usually on a raid they carried only their arms, a blanket and 100 rounds of ammunition; they depended entirely on the country for food and forage and, thanks to the information obtained by the spies, they had very little trouble in getting it. Morgan nearly always marched at a walk in order to enable foraging parties being sent out and to requisition horses to supply the place of those knocked up and, as they frequently marched for 15 or 16 hours in a day, distances up to 60 miles could be covered in the 24 hours. Morgan's first important raid was made into Kentucky in July 1862. He started on the 4th with 900 men from Knoxville in Tennessee and moved to Lebanon in Kentucky where large supplies of stores were captured. He continued his march northward to Midway on the railway between Frankfort and Lexington; the latter place was the Federal head-quarters of that district, and here he found himself surrounded on all sides by enemies. By skilful marches, by scattering his forces and threatening several points at once, he bewildered the Federal Commander who did not know where to expect a blow. The most extraordinary use of the telegraph was made at Midway by a Canadian named

Filsworth, who was a skillful operator attached to Morgan's command. By tapping the wires he interfered with the arrangements of the Federal Generals, sending their troops in wrong directions by forged orders which he despatched in place of those he interrupted. General Basil Duke in his history of Morgan's cavalry gives a summary of the raid as follows:—General Morgan left Knoxville on the 4th of July with about 900 men, and returned to Lexington on the 28th with 1200, having been absent 24 days, during which time his command travelled over 1,000 miles, captured 17 towns, destroyed all the Government supplies and arms in them, dispersed 1,500 Home Guards and paroled nearly 1,200 regular troops. His losses in killed, wounded, and missing were about 90, and he recruited several hundred men on the march.

In July 1863 General Morgan made his boldest and most extensive raid through Kentucky and Indiana. After doing great damage in the enemy's rear he was at last cut off on the banks of the Ohio and captured with a great portion of his command, a sudden and unexpected swelling of the river having rendered all the fords impassable. On this raid he made his longest march, from Summansville in Indiana to Williamsburg east of Cincinnati, a distance of more than 90 miles in 35 hours. The failure of his Ohio raid is partly to be attributed to direct disobedience of instructions. He was ordered by General Bragg merely to go into Kentucky, break up the railway, and threaten Louisville, in order to give Bragg time to fall back on Chattanooga. Morgan wanted to extend the raid by making a wide sweep across the Ohio, but Bragg would not hear of it. Directly he got away from Bragg he endeavoured to carry out his own plans and failed. Out of his two brigades only 300 escaped. Morgan was confined in the State Penitentiary at Columbus, Ohio, until November 27th, when he proved himself a good man all round, an undeniable cavalry leader, and as full of resource as ever, by tunneling through the prison wall and escaping with five others. Later on he commanded in south-west Virginia. After another disastrous raid in Kentucky he was killed at Greenville in Tennessee September 4th 1864.

It must be remembered that Morgan operated almost entirely in his own state, Kentucky, which was quite half Secession. His men were nearly always well received, and food was willingly given them; he was constantly able to replace horses when they were done up, and information of the enemy's movements was readily given by the inhabitants. He was one of the first of modern generals to introduce the system of officers' patrols, and to send small scouting parties 15 or 20 miles ahead of his column, which generally marched by one road.

The United States Government began to recognise by 1863 the importance of having a large body of cavalry well organized and armed, not only to cope with the raids of the Southern cavalry but also to make raids on their own account. The first successful raid on a large scale, made by the Federal cavalry, was in April 1863. General Grierson started with 3 regiments of cavalry about 1,700 strong from La Grange in Tennessee, and went through the State of Mississippi, ransacking the whole country, cutting railways and telegraph lines,

burning rolling stock, bridges, and stores. He arrived at Baton Rouge on the Mississippi river in Louisiana on the 2nd May without loss, having travelled 300 miles in 16 days through the enemy's country. General Grant says :—

"This raid was of great importance as it attracted the attention of the enemy from the main movement against Vicksburg."

On February 28th 1864 General Judson Kilpatrick crossed the Rapidan at Ely's Ford with 4,000 Federal cavalry, surprised and captured the enemy's picket there, and marched rapidly by Spotsylvania Court House toward Richmond.

His object was to move rapidly past the enemy's right flank, enter the Confederate capital, and release the Union captives in its military prisons. He was also instructed to circulate within the Confederate lines President Lincoln's amnesty proclamation; he was besides to raid upon the enemy's supplies and communications. Colonel Dahlgren was to separate from him near Spotsylvania with 500 picked men, cross the James River, enter Richmond from the south, and after liberating the Belle Isle prisoners, unite with Kilpatrick's main force entering the City from the north at 10 A.M., Tuesday March 1st.

Reaching Spotsylvania Court House at early dawn of February 29th Kilpatrick moved south through Chilesburg to the Virginia Central Railway, which he struck during the day at Beaver Dam Station. The telegraph operator was seized, the wires cut, the track destroyed, and the station buildings burned. Detachments were sent to destroy bridges and track on the Fredericksburg railway, and during the raid the amnesty proclamation was distributed.

At nightfall on the 29th the main body moved forward and crossed the South Anna at Ground Squirrel Bridge. Early on Tuesday, March 1st the column was again in motion and by 10 o'clock faced the Northern lines of Richmond on the Brook road 5 miles from the city. Its arrival was wholly unexpected, still a telegraphic despatch that Union cavalry were raiding south of the Rapidan having reached Richmond the day before, the Confederate General (Elzey) had sent out troops to the west and north of the city. Kilpatrick's advance quickly drove back this force and he moved close up to the inner lines of the defences. Some skirmishing with artillery went on, Kilpatrick meanwhile awaiting signs of the approach of Dahlgren.

Dahlgren on separating from Kilpatrick at Spotsylvania had moved and struck the Virginia Central Railway a little E. of Frederick Hall station, capturing a detachment of Maryland artillery and also about a dozen commissioned officers who were holding a court-martial. At night he crossed the S. Anna, and early the next morning reached the James River about 16 miles W. of Richmond; he was to cross at a ford which a negro guide had promised to indicate, but the Colonel did not find the expected fording place and proceeded instead on the N. side of the river. At 3-30 P.M., 8 miles from Richmond an enemy's picket was captured and men and horses fed off captured supplies. Guns, supposed to be Kilpatrick's, were heard, and Dahlgren moving forward, about 5 miles from the city encountered a sharp musketry fire

from the troops sent out westward to oppose him. The resistance grew heavier, darkness came on and the firing attributed to Kilpatrick ceased. In fact the latter officer, ignorant of how small a force he really had in front of him, wondering what had become of Dahlgren, and seeing what he took to be reinforcements for the enemy, had now abandoned the attempt to enter the city, and had fallen back several miles to encamp at Atlee's station. Dahlgren on his part feeling it to be hopeless at that late hour and with his small force to advance, gave the order to withdraw. The attempt to liberate the Union prisoners had failed; extrication from this position was the next step. The Confederate cavalry had followed Kilpatrick down from Beaver Dam, and now sharply attacked him late at night at Atlee's station. The following day his rearguard was harassed somewhat as he moved down the peninsula. According to the original plan he proceeded to Williamsburg within the lines then occupied by the troops of General Butler, Dahlgren was less fortunate. During the night his command became divided under the pressure of the enemy. Captain Mitchell with 300 men by great exertion fought his way through the Confederates and joined Kilpatrick next day (March 2nd) at Tunstall's station near White House. Dahlgren with the remainder crossed the Pamunkey at Hanover town and the Mattaponi at Aylett's; but late on Wednesday night he fell into an ambush near Walkerton and was killed; most of his command were captured. This raid seems to have failed in its main object, releasing the prisoners—first because Dahlgren was unable to cross the James and came up a few hours late on the 1st, and further from Kilpatrick not pushing home his attack on the inner lines of Richmond when no doubt he would have been able to get into the city.

Another raid was made on Richmond by General Sheridan two months later, May 9th 1864. The effective strength of the cavalry of the Army of the Potomac was 12,400 divided into three divisions, and to each division were attached two batteries of H. Artillery. An advance of cavalry and infantry was made across the Rapidan on May 4th, and on the 9th Sheridan was detached with 10,000 of his cavalry on Richmond. A small ammunition train, two ambulances per division and a few pack mules accompanied, with three day's rations and $\frac{1}{2}$ day's forage on the saddles. The whole body moved off on one road making a column *13 miles long* which took four hours to pass a given point; the Confederate cavalry harassed the march and numerous skirmishes took place. Passing through Chilesburg late in the afternoon, the leading brigade charged into Beaver Dam station at a trot. Two trains with prisoners and wounded were passing through at the moment and about to start for Richmond; 378 Union prisoners were released, the trains and buildings were burned, 1,500,000 rations and medical stores for Lee's army destroyed, the wires cut, and track torn up for some distance, the work being continued throughout the night while the main body rested. By next morning Stuart had collected a large force of cavalry and attacked; Sheridan advanced to Ground Squirrel bridge over the South Anna river and bivouacked. On the following morning a party was sent to break up the railway at Ashland and the main

column moved on Glen Allen station. The Confederate cavalry resisted the advance but were driven back by overwhelming numbers, and Stuart killed. Sheridan advanced through the outer defences, but thought it wiser not to risk the loss of men which street fighting would entail. The houses in the suburbs of Richmond were loopholed, the streets barricaded, and there was a general call to arms in the city. By way of Bottoms Bridge the corps moved to Malvern Hill and Haxalls; on the 21st it crossed the Pamunkey near White House, encamped at Aylett's on the 23rd, and rejoined General Grant at Chesterfield on the 25th. The raid had been fairly successful, it had drawn away Stuart and his cavalry from Lee's army, damaged stores and communications, and for three weeks lived on three days rations and $\frac{1}{2}$ a day's forage. Stuart's death was a great blow to the Southern cause. Sheridan's loss was 625 killed and wounded and 300 horses.

In the spring of 1865 the cavalry corps under General James H. Wilson was encamped at Gravelly Springs and Waterloo in Alabama on the North bank of the Tennessee. He received instructions to make a raid on Tuscaloosa and Selma to draw off the enemy's attention from General Canby's operations in Central Alabama. The movement was delayed nearly three weeks on account of heavy rain and on the 18th March the command crossed the Tennessee in three divisions and three batteries, about 13,000 in all. At the commencement of the advance, the troops were scattered for supply, the whole country having been devastated by war. The Confederate cavalry under Forrest were in Mississippi, 150 miles south-west while Roddey's brigade was nearly the same distance south-east, leaving the country due south almost unoccupied. The command united at Jasper and from there moved across the two forks of the Black Warrior river on Montevallo. At Elyton on the night of the 30th Croxton's brigade of the first division was detached to move on Tuscaloosa as rapidly as possible, burn the public stores, military school, bridges, foundries, and factories at that place, and rejoin the command near Selma. Upton's division destroyed the Cahawba Iron works and collieries, and at Randolph met General Roddey's brigade of Confederates: two engagements ensued and the Southerners were driven back. At Randolph Upton captured a rebel orderly with two despatches from which he learnt that Forrest was in his front with a strong force; one Confederate division had arrived near Scottsville and another at Marion, also that the detached Union brigade was to be attacked the following day. Wilson pushed on towards Selma and encountered Forrest 5,000 strong at Ebenezer Church; he attacked at once and drove him back on Selma. On the night of April 1st the whole corps bivouacked at Plantersville 19 miles from Selma. At daylight on the 2nd the advance was taken up and the troops arrived in position in front of Selma by 4 P.M. Selma was fortified with a bastioned line of earthworks three miles long, the profile of which was—height of parapet 6 to 8 feet, thickness 8 feet, ditch 5 feet deep and 10 to 15 feet wide, with a well-built stockade on the glacis. On the west of the city the lines are covered by a deep miry creek and on the east side by a swamp impassable for mounted men. Two divisions dismounted for the attack

which had to be made over open ground for some six hundred yards exposed to the enemy's rifle and artillery rifle. The assault was made by 1,550 dismounted cavalry, and the works were taken in less than an hour with a loss of 40 killed and 260 wounded including General Long commanding the 2nd division. The earthworks directly assaulted were defended by about 1,500 Confederate cavalry, the whole garrisons including militia was estimated at 7,000. The immediate fruits of the victory were 32 guns, 2,700 prisoners (including 150 officers), and immense stores of every kind. General Forrest with a large portion of his command escaped by swimming the Alabama. On April 8th and 9th the entire cavalry corps (except Croxton's brigade detached from Elyton March 30th) crossed the Alabama and reached Montgomery on the 12th, which was surrendered by its Mayor to the advance guard. After destroying a large quantity of stores, small arms, and cotton, the command advanced on the 14th towards Columbus and West Point. On the 16th the enemy's pickets were driven back on Girard, but in retiring over the Chattahoochee the rebels set fire to the bridge. General Wilson then made a reconnaissance in person and found the enemy strongly posted in a line of works covering all the bridges, with a large number of guns on both sides of the river. He ordered an attack but the troops did not reach their positions till dark. Nevertheless 300 men of the 3rd Iowa cavalry were dismounted and dashed forward to the attack at 8-30 p.m. The enemy opened a heavy fire of musketry and canister from a four gun battery at close range, but the rapid fire from the Federal repeating carbines was too much for the Southerners and they had to fall back. The Federals pressed on and got possession of the bridge over the Chattahoochee leading into Columbus. Reinforcements arrived from General Wilson and the town was occupied. Twelve hundred prisoners, fifty-two field guns, and large quantities of arms and stores were captured. The rebel force was over 3,000 and found it hard to believe they had been driven out of their works by 300 men. A brigade was detached to occupy West Point, where more prisoners were captured. Fort Tyler, commanding the bridge over the river, a strong bastioned earthwork 35 yards square, surrounded by a ditch 12 feet wide and 10 feet deep and mounting four guns, was captured after a desperate struggle, during which the Federals bridged the ditch under the fire, losing 7 killed and 29 wounded. At Columbus Wilson destroyed the rebel ironclad ram "Jackson" nearly ready for sea, mounting six 7 inch guns, burned 15 locomotives, 250 ears, the railroad bridge, 115,000 bales of cotton, four factories, the navy yard, foundry, armoury, sword and pistol factory, and 100,000 rounds of artillery ammunition. The rebels abandoned and burned the gunboat "Chattahoochee" 12 miles below Columbus. On the 30th Macon surrendered to the advanced guard, and the day Wilson received a communication from Sherman directing him to suspend hostilities until notified of the result of negotiations for peace then pending. General Croxton here rejoined the corps of May 1st with his brigade, having captured Tuscaloosa and destroyed the stores and public works at that place. He reached Carrollton in Georgia on the 25th April having marched

650 miles in 26 days; he had to swim four large rivers and marched through a hilly country almost devoid of supplies. He did an immense amount of damage, and lost 4 officers and 168 men. The aggregate loss of the Federals during this raid was 99 killed, 598 wounded and 28 missing, total 725 out of an effective of about 13,000.

Having examined all these different raids, made with more or less success, by numbers varying from 900 men to 13,000, it remains to be seen what useful information can be gathered from them to enable us to carry out successful raids if an opportunity should occur.

First of all it seems that careful preparation is necessary for success. Horses and men must be so trained and hardened beforehand that they may be able to endure the excessive fatigue and hardship they will certainly have to undergo. The raid must be well planned and the country scouted in anticipation; all these American leaders had their special scouts and spies, which they sent forward and kept out during the raid. In this matter the Confederates had a great advantage, the country was nearly always friendly to them although occupied by hostile troops, and it is said that their spies often knew more about the Federal movements and positions than the Northern Generals themselves. The Federal spies ran much more risk. The country people were generally against them, and would be sure to give information if they suspected anything. Often, disguised as Confederate soldiers, they served for a time in the enemy's ranks.

A definite object should of course be laid down for the raid, but no marches could be fixed with certainty beforehand; the enemy's movements would frequently decide that question, and to baffle him the least expected direction should be taken.

The composition and numbers of a raiding party must depend on the objects to be gained, the country raided and the opposition that may be expected. A small force would seek to gain its object by eluding the enemy and avoiding a fight as much as possible; while a strong body, such as Sheridan had, in his Richmond raid, can often accomplish its object by main force and pushing aside all opposition.

The American cavalry were practically all mounted rifles; for a raid made by us I would suggest equal numbers of cavalry and mounted infantry, with horse artillery and machine guns at the rate of two per 1,000. Guns would not often be used perhaps, but they might just make the difference at a pinch between success and failure. I don't see why a certain number of infantry should not be carried in carts, and, if it comes to that, why should not a special cart be built for the purpose. General Dembinski in his raid in Poland round the Russian army had 50 horses told off to each infantry battalion, and it is said they made wonderful marches by this means.

There is no doubt why our cavalry do comparatively so little dismounted service, we are not properly equipped for it; the opportunities for dismounted service are so fleeting as a rule that by the time the men have formed up on foot and got the ammunition from their exceedingly clumsy pouches, the opportunity has passed. If we had better

arrangements for our ammunition (such as the bandolier,) and a repeating or magazine carbine, I am convinced we should be able to act on dismounted service far more effectively than we can at present.

Attached to the command there should be special parties for destroying railways and bridges, and skilled operators for tapping telegraph wires.

As regards the rate of marching, it will be seen from the examples given that rapid marches can be done at a walk ; but this is not our own experience in marching nor, I may add, that of the Russians who make a feature of practising long distance marches and rides ; we consider that the great thing is to get the weight off the horse's back, and give him plenty of time for food and rest, so long as the pace is not too hurried ; the longer a man is in the saddle the more tired he gets, and the more carelessly he rides, resulting in sore backs and galls.

I think the reason why the Americans generally marched at a walk, was to enable their scouts to keep well ahead and send in timely information, and also to allow their foraging parties to collect supplies and bring them up to the road. Why they so often marched on one road even with 10,000 men I can't imagine, unless it was that there was no other available.

If the enemy is well served by his scouts and receives good and accurate information as to the movements of the raiding force, there ought to be no difficulty in minimizing the effect of a raid. By means of the telegraph, troops can be ordered up from all directions by train to hold important posts protecting stores and magazines, so that the raiders would waste time in making a serious attack. Fords, bridges, and other defiles might be held in front while the troops closed up in rear ; this is what happened to Morgan on this Ohio raid. Miscalculations as to time, change of weather, and heavy rains by making the roads deep and the rivers impassable would imperil the success of a raid. In the first part of the war the success of the Confederate raids seems to have been won by the friendliness of the country they raided in, the dash and resource of their leaders, and the faulty scouting and want of enterprise on the Federal side. Why the Confederates failed during the latter half of the war and the Federals in turn made such successful raids, is that the Southern States became worn out and drained by the increasing demands of war on their resources ; whole countries were almost denuded of troops and fell an easy prey to the overpowering numbers of the United States, whose cavalry were not slow to learn of the Southerners how cavalry should be worked on a raid.

In conclusion the secret of success lies in always pushing forward ; no doubt a cavalry raid is attended with very great risk, the slightest and least suspected *contretemps* may upset everything, Nevertheless, though the force may suffer greatly, the risk may be worth the running, and even should the losses be heavy the survivors who win their way to the end and arrive safe in their own lines should be able to tell a tale that may mean the winning of a campaign.

Major Mason, Cdt. 4th Lancers H. C.

Colonel Elton and gentlemen.—I am sure you will agree with me that we owe a vote of thanks to Major Crole Wyndham, for the very interesting lecture, he has given us this evening.

The Briton has ever been a lover of adventure, daring and enterprise. Trace the career of the boy at school who robs the apple orchard, not altogether for the apples, but also on the off chance that he may play the part of hare, in the chase that is likely to follow. He then goes to college, where he dreams of winning his football colours, and on joining the regiment, works in the saddle morning and evening to gain a place in the polo team.

How eagerly too he accepts a mount in the steeple-chase, where the bigger the jumps are, the better he likes them. By taking part in such sports as these, gentlemen, we retain our nerve; and it is from this stamp of men, such leaders as we have heard of to-night, are drawn.

I should like to say a few words, to those present, who are likely to be selected to act as umpires, in the coming season's manoeuvres. I would ask them in giving their decisions to bear in mind the lecture we have heard this evening, and be less bloodthirsty than they are generally to the cavalry.

You have heard to-night of cavalry taking large numbers of prisoners, with comparatively little loss, whereas in our peace manoeuvres, should an officer commanding a regiment or squadron have sufficient temerity to attack a regiment of unsuspecting Infantry, completely surprising them, he is generally told that his force is annihilated for daring to attack infantry, and he is put out of action for the rest of the day.

I mention this, because it is only by training ourselves and men in time of peace, to seize the opportunity, that we are preparing to perform those deeds of dash and daring, which are requisite in the performance of cavalry raids.

I think you will agree with me, gentlemen, that Native cavalry, owing to their mobility, supplied as they are with their own transport, are well suited to perform cavalry raids. You may not know however, that up to date, no instruction in Pioneer work is permitted to be given to native troops.

Nothing therefore, is known by native cavalry, of the use of dynamite, how to blow up bridges, devastate railroads, and tap telegraph wires &c. As the loyalty of the native army must now be fully assured I trust that Government will soon see fit to remove the objection that has hitherto existed, and permit selected men to be trained in this branch.

There is a point on which I am quite one with the lecturer, and that is as opportunities for dismounted work are very transcient, the magazine carbine would be a splendid arm for cavalry.

The English cavalry are pretty sure to get these before long, but as the native cavalry have not yet even received the full complement of Martini-Henry carbines, it is unlikely they will receive the magazine carbine for years to come.



If behoves therefore officers of native cavalry to pay special attention to ensure the easy and rapid handling of ammunition, as without doubt, the style of pouch now in use, is not only cumbersome, but it is a difficult matter to take ammunition rapidly from it.

I would also suggest that consideration be given to slinging the carbine on the back of the trooper, when in the vicinity of the enemy. Now that the sword is worn on the saddle, and the carbine carried in the bucket, should a man be thrown from his horse, or, his horse be shot under him, he suddenly finds himself dismounted with no arm, wherewith to protect himself, whereas if his carbine was on his back, he would have the best arm at his disposal.

Some few years ago, I was acting Orderly officer to the G. O. C. Sirhind division on the occasion of that smart regiment, the XI Bengal Lancers, marching out of Umballa on escort duty to the Boundary Commission. Every man's carbine was on his back, so it is evident the experience they had gained in the many campaigns in which they had been engaged, had proved to them the advisability of carrying the carbine in this way.

I have lately provided the regiment under my command with a belt suitable for slinging the carbine, and it is my intention to thoroughly test their method of carrying it, during the coming season's manœuvres.

Captain E. E. M. Lawford, 1st Madras Lancers, A. A. G., Secunderabad District said :—

I agree with the lecturer, that the success attending the raids in the American war was due :—

1st. In the case of the Southern cavalry, to the fact that the population was generally friendly.

2ndly. In the case of the northern cavalry to the fact that the southerners were then beginning to lose heart, and give up the struggle.

But, as Prince Kraft says, although raids were possible and useful in America, it does not at all follow that it is advisable to employ them in Europe, either in the Franco-German, or in any future war. "In the American War of Secession, as in all civil wars, the population was everywhere divided into parties. The raiding cavalry found friends everywhere, even among their enemies. The means of obtaining news, the care of the wounded, and the subsistence of the troops, took quite another character, when it was possible to count upon the willing assistance of at least a part of the inhabitants. Moreover, there were large forests in which the cavalry could conceal themselves, and march quite unseen, as when, for example, Stuart's cavalry, on the 26th August 1862 passed by the little town of Orleans, without anyone knowing it. "Such a thing would be impossible in most parts of France, and indeed of Europe. The whole character of the conduct of the war was different.

Many German critics declare that during the Franco-German war, the German cavalry should have been employed in "breaking up the mobilization" of the French troops. Now, as Prince Kraft says :—"They must have had in view some distinct object, which would have been worth the stake risked for it. Objectless galloping about through the

enemy's mobilization, would have produced little effect. Even, if here and there, a company or battalion of peasants, marching perhaps to their place of rendez-vous had been broken up, that would not have been of much use at a time when Gambetta had collected 200,000 men, under Aurelle de Paladines. Some of these people might have been cut down, if they had defended themselves; but if they had not resisted they must have been allowed to run away again. There would have been no time for taking them prisoners."

Cavalry divisions could it is true, devastate the country and burn defenceless villages and towns, but civilized warfare forbids this.

"The throwing the cavalry into the midst of the mobilization, should have some other object which might exercise a decisive influence over the course of the war, since such raids should certainly not be undertaken for the pleasure of making them, or in order to take masses of cavalry for a ride."

"It is only possible to conceive one object for them:—namely, to reach the point of rendez-vous of the newly formed troops, to drive away the men who had been collected there, and to burn such *material* in clothing and arms as might have been collected."

Prince Kraft then goes on to say that several raids by the German cavalry were actually projected and even begun, but they turned out impracticable. He says that after Sedan the German cavalry might have got through the line of outposts, and well in rear of some of the armies, but that then the French telegraphs and railways would have been put into play, and thousands of newly-raised and other troops, would have been massed to cut off the retreat and prevent the return of the raiding cavalry. Rivers and villages would have been strongly held, roads and defiles blocked, and the raiders, with all their ammunition expended, with no rations nor forage, and with the whole population against them, must either have had to lay down their arms, or have been miserably destroyed. Prince Kraft is of opinion that during the war with France, "to have detached large masses of cavalry on such an uncertain undertaking as a raid must always be, would have been liable to weaken and endanger the dearest and most vital interests of a logical system of war, and would moreover, have been entirely wrong." He considers that "such undertakings could have had no prospect of success."

He however, thinks that the French cavalry might have been usefully employed, during the latter part of the war, when the Germans were in front of Paris, raiding on the German lines of communication, destroying villages, cutting off supplies, and burning provision columns, &c.

The French would have been working in their own country, favoured by the inhabitants, and could have been hidden in the dense forests of the Argonne, raiding—on information brought in by spies. The only weak point in this programme is, I think, that by this time, all the good French cavalry had been destroyed, and that nothing worthy of the name of cavalry had been formed to take its place.

Major Wyndham recommends that guns should, as a rule, be taken on a raid; I think that in any but a very open country, they would be terribly in the way. Cavalry can swim rivers, but getting guns across is a difficult matter.

Major Wyndham states he can't imagine why the American cavalry, when raiding, so often marched on one road. Colonel Trench tells us, that it was to have them at hand when wanted. The American leaders considered this impossible when their troops marched by several parallel routes.

Now, take ourselves. I ask you to assume that hostilities were about to break out on the north-western Afghan frontier, against a first-class power, and that we had thrown by forced marches, a large force of cavalry, into say Herat, the Afghans being assumed to be friendly to us. I think that on the outbreak of war, this cavalry force might be very usefully employed in raiding, under a smart cavalry leader, and that an enemy, using a single line of railway to bring up its troops and supplies &c., through over 300 miles of an inhospitable and unfriendly country might be considerably harassed to say the least of it.

I agree with the lecturer too, in thinking, that in the Boer War, if peace had not been declared after the Majuba disaster, our strong body of cavalry which had then been collected might have successfully raided the country, and made it warm for the Boers, bringing them speedily to terms, and restoring our prestige.

Before sitting down, gentlemen, I should like to read you, (if I am not wearying you), the opinion of the greatest living writer of the day, on the Art of War, the Baron Von der Goltz, on the subject of "Cavalry Raids." He says :—

"The American War of Secession makes us familiar with many cavalry "raids," on which the names of a Stuart, an Ashby, a Morgan, and others, attained great renown.

But in attempting to transfer them to our theatres of war, we must primarily take into consideration the different nature, civilization, and extent of most European countries, but more especially, those of the west. Then, regard must be paid to the different constitution of the forces. If a squadron of horse, improvised by a partisan, was defeated in such an enterprise, or if, when surrounded by the enemy, it broke itself up, that was of little consequence.

It was only necessary that it was first recompensed by some successes. Quite a different impression would be caused by the annihilation of one of our cavalry regiments, which by history and tradition, is closely bound up with the whole army, and which when once destroyed cannot so easily rise again, as can a volunteer association of adventurous farmer's sons.

The thorough organisation of the defensive power of civilized nations is also a preventative to raids. Even when the armies have already marched away, squadrons of horse, can, in thickly populated districts, with a little preparation, be successfully repulsed by levies.

The French franc-tireurs in the western departments attacked our cavalry, as soon as they saw it isolated.

In such enterprises on the theatres of war, small boldly led detachments, will, by cunning and celerity, sooner attain their object, than great masses will by force.

It is only the daring, enterprising spirit of the American horsemen that we can take as a model ; the manner of carrying it out, must upon European soil, be totally different.

Captain Pilkington, 21st Hussars.

"In spite of Captain Lawford's opinion and of the high authorities he has quoted, I cannot help thinking that cavalry raids are likely to take a prominent place among the operations in future wars in Europe and elsewhere ; for a glance at the maps which Major Wyndham has prepared to show the present posts of the cavalry on the frontiers of European powers, convinces me that rightly or wrongly raids will take place at the beginning of the next European war. Although as Captain Lawford said, it would have been impossible for any raiding body of cavalry to make prisoners of General D Aurella de Paladines and his 200,000 men, it is no by means impossible for such a force to be reduced to a very wretched plight by having its supplies stopped for a day or two, and this is just what a cavalry raid might do for such a force. In fact the concentration of such enormous masses of men as we see brought together in these days is one of the very features of modern war which will put a new weapon into the hands of enterprising cavalry.

The reason, I take it why cavalry raids have not in old times taken the prominent place in warfare that some people believe they may take in future, is that the whole soul of raiding, as we now understand it, is the destruction of railway and telegraphic communications and that in former times railways and telegraphs either did not exist at all or the opportunities that their existence offered had not been fully appreciated.

From what the lecturer and other officer's have said, the importance to cavalry intended for raiding of great marching power, of skill in swimming rivers, of the technical knowledge necessary in dealing with railways telegraphs and bridges, and of the art of holding defiles, has been made clear as regards the holding of defiles, and fighting on foot generally, I am strongly of opinion that we neglect such matters far too much from the chimerical fear that we shall degenerate into mounted Infantry. I am one of those who believe that cavalry—if trained to it—can do all that is expected of mounted infantry and be thoroughly efficient cavalry as well. If there has been any obstacle to their doing so in the past it has consisted in cavalry being of necessity armed with an inferior fire arm, but this obstacle will have disappeared as soon as we are armed with a small-bore magazine carbine which will practically be as good a weapon for a mounted man as the longest rifle. But it is not in dismounted duty only that we need more careful training. That technical training in the use of explosives and in railway and telegraph destruction, and in making and unmaking bridges which is, I think, misnamed "cavalry pioneering", might with advantage be made more thorough and imparted to a far greater number of officers and men. As to swimming rivers, I can only say that I fear a small river would be found a serious obstacle to many of our regiments. Closely connected with power of marching is the question of equipment which I would not men-

tion except that it has already been touched upon by Major Mason. I agree with Major Mason as to carrying the carbine on the back during actual engagement, not only that the trooper may have it, should he lose his horse, but because it is such an excellent protection against sword-cuts. During the march it would do more damage on the man's back than on the horses, but I may mention that some of the evils of the bucket system may be avoided when marching at a walk by carrying the carbine across the knees resting on the thighs and the wallets. For raiding and detached duties generally lightness of equipment is of course of primary importance, and I should, I confess, like to see more use made of pack animals and the basis of all equipment taken to be that our horses should not be made to carry more weight than the horses we have got are capable of carrying.

It has been suggested that mounted infantry might be a formidable arm with which to oppose cavalry raids. With regard to this I will only say that there does not seem to be much fear of British cavalry having to oppose mounted infantry, since the mounted infantry cult does not appear to have extended itself as yet beyond our own army.

Major Westmorland, A. A. G. Hyd. Contingent :—

I think we must accept with a great deal of caution the results obtained by large cavalry raiding parties in the American civil war.

The conditions in this campaign were so utterly different from any which are likely to occur in either Europe or Asia that I think it has yet to be seen whether these large cavalry raiding parties can be usefully employed in modern warfare and whether the operation of small parties detailed for some specific work would not be just as effective and far less risky.

No doubt in the American war an immense amount of general and often objectless damage was done on both sides by these raids, the results being about equal; but I doubt if this materially affected the ultimate issue of the campaign which was decided by the superior number, wealth and resources generally of the north.

Major Cole Wyndham, 21st Hussars :—

It has asked why we alone of European nations indulge in the luxury of mounted infantry. The reason seems to be that Continental Armies have found that mounted infantry generally develop into bad cavalry, moreover they have not the same necessity for them that we have with our endless sequence of small wars all over the world, when cavalry is seldom available. In south Africa, Egypt and Burma, there can be no two opinions about the splendid services rendered by the mounted Infantry. In 1874 the Czar of Russia offered three prizes for the best book on cavalry; one of them was won by Colonel Denison's history of cavalry, a book in which the author praises very highly the work done by the American mounted rifles in the war of Secession and urges strongly the introduction of mounted rifles into European armies. The Russians carried out this suggestion and organized their dragoons as mounted rifles armed with rifle and bayonet. I believe, however, that

after a few years experience they are changing their dragoons again to *bond-fide* cavalry. The infantry soldiers of Continental nations do not as a rule make good horseman, nor with their short service have they time to train men for mounted infantry.

Captain Lawford has quoted several great Continental soldiers who condemn cavalry raids and assert that the only thing we have to copy from the American cavalry is their intrepidity and dash. I should like to point out that though there may have been no opportunity for raids during the Franco German war we have a very large field for this service in our Colonial campaigns and small expeditions in all parts of the world. I would further suggest that taking prisoners at a distance from their own lines would be most undesirable on a raid by cavalry but that the destruction of railways and telegraphs, even temporarily, cannot but cause great inconvenience to the enemy. I maintain that a small number of guns may prove of incalculable advantage in an emergency, while at the worst, if unable to be dragged along, they can be rendered unserviceable and abandoned.

SCHEME FOR THE ORGANIZATION OF NATIVE CAVALRY REGIMENTS.

By Major C. S. WHEELER, 6th Bengal Cavalry.

Before proposing a scheme it is absolutely necessary to know beforehand, whether regiments are to go on service with 4 or with only 3 squadrons.

General idea.

If the former, a regiment must consist of 4 squadrons and a depot, and each squadron should be of equal strength *at least* to any we are likely to meet in the field, when fighting against a civilized power. That is of a strength of 150 sabres. It has already been decided that the strength of the depot is to be 125. This would therefore mean a total strength per regiment—

Of 4 squadrons of 150 each = 600

And a depot of 125 = 125

Total... 725

i. e. an addition of 100 men to each regiment, necessitating (unless a certain number of regiments are reduced) a greatly increased expenditure on the State, a contingency Government is not willing to face. It would therefore be out of place to discuss the merits and drawbacks of this scheme. On the other hand, if regiments are to take the field with 3 squadrons only, the following scheme is submitted for consideration.

A regiment to consist of three squadrons and a depot. Each squadron of four troops, both for administrative purposes and for the field, as follows :—

(a.) Organization, Native Ranks.

1 Native officer (Ressaldar, Ressaidar, or Jemadar.)

5 Non-commissioned officers (one to *act* as K. Duff.)

36 Rank & file (including Nalbunds & Trumpeters or Acting Trumpeters.)

Total 42.

N. B.—(Acting Trumpeter's pay to be the same as a Sowar's.)

The depot to consist of—

3 Native officers (including the Woordie-Major *attached* only).

14 Non-commissioned officers.

104 Rank and file.

Total 121. (Details given further on).

Summary of the above.

	Native Officers.	Non-Comd. Officers.	Rank and File.	Total.
3 Squadrons	12	60	432	504
Depots	3	14	104	121
	15	74	536	625

Showing a reduction on the present strength of two Native officers and eight sowars, and an increase of 10 non-commissioned officers. These 10 non-commissioned officers hold temporary rank only, draw less pay than the other non-commissioned officers, and belong to the depot, as will be seen in the details further on.

1 Commandant with staff pay of	Rs. 700
One 2nd in Command	350
Three Squadron Commanders with staff pay of Rs. 250	
(b) Organization British Officers. each	750
One depot commander	200
One adjutant	250
Three squadron officers at Rs. 150	450

Total. Ten officers, drawing staff pay per month of Rs. 2,700

At present the staff pay of officers is

One Commandant... ..	Rs. 700
1st Squadron Commander	300
2nd ditto	210
3rd ditto	180
4th ditto	180
Adjutant	250
Three squadron officers at Rs. 150	450

Total. Nine officers, drawing staff pay, per month of Rs. 2,270

This shows an increase in staff pay per mensem of (*i. e.*

Rs. 2,700 minus Rs. 2,270)	430
Add pay proper of one subaltern	225

Total increase per month. Rs. 655

(c) Organization, depot.

Depot to consist of—

1 British officer... { and Adjutant temporarily attached in peace
time.

- 3 Native officers.. { 1 Ressaïdar.
 { 1 Jemadar
 { 1 Woordie-Major (attached only.)
 4 Non-commissioned officers.
 10 Acting non-commissioned officers.
 104 Rank and file.

The great drawback of a depot is the dislike of all ranks to serve in it, as they are left behind when their regiment is ordered on active service. Hence the difficulty of getting really good men for it. But if the depot were made a step to further advancement *for all ranks*, the difficulty is immediately overcome. This might be effected as follows:—

(a.) *British and Native officers.*—The British officer in command Depot British Officers & Native of the depot, being junior to the squadron commanders, gets his squadron when a vacancy occurs, that is to say, the depot is his stepping stone to a squadron command.

The same for the Native Officers.

(b.) *Depot non-commissioned officers.*—The four Non-commissioned Depot Non-Commissioned Officers. Officers of the depot to consist of—

- 1 Kote duffadar.
 1 Head rough-riding duffadar.
 2 Assistant ditto.

The kote duffadar and head rough-riding duffadar should be the smartest men in the regiment, undergoing in the depot their probation for a commission.

The two assistants would replace them, if considered fit to do so.

The ten acting duffadars to consist of, (a) 3 smart men from each squadron, who are considered to be the next most likely men for promotion, and of (b) the senior or most efficient pay sowar in the regiment; all with *temporary* rank of Duffadar only, drawing pay at the rate of Rs. 38 p. m. in lieu of Rs. 42. These 10 duffadars would be attached to and *borne on the rolls of the depot* during the period of time only that they serve in it; *i. e.* whilst undergoing their probation for *permanent* promotion to a duffadaree. If, (1) they did their work well in the depot, and were considered fit for promotion, they would each, in turn, get a permanent Duffadaree in their respective squadrons *on a vacancy occurring*, other men being then sent from these squadrons to replace them. On the other hand, if (2), after a fair trial in the depot, the commanding officer did not consider any one (or more) of them as likely to make a good non-commissioned officer, he (or they) would revert to their own squadrons with loss of acting rank, and of the increased pay attached thereto, The vacancies thus caused in the depot being filled up by other selected men from these squadrons.

(c.) *Depot rank and file.*—All recruits are first posted to the depot, and are not transferred to a squadron until fully trained and on vacancies occurring.

occurring.

(N. B.—It is needless to add that recruits *unlikely* to become good soldiers are discharged *direct from the depot*, without ever having joined a squadron).

There are 104 sowars in the depot consisting of,

- 2 Trumpeters.
- 2 Nalbands.
- 4 Camel sowars (*none* in squadrons).
- 1 Account office writer.
- 1 Vernacular do.
- 1 Schoolmaster.
- 1 Assistant pay sowar.
- 2 Ward orderlies.

(Say) 60 recruits undergoing training.

Total 74, leaving a balance of 30 men, who might be either dismissed recruits waiting for vacancies in a squadron or a leaven of old soldiers of steady character to give a certain solidity to the *dépôt*.

The depot would then become, *not a* place men would shy at, nor where they might be *permanently* kept, but a temporary training ground through which every man in the regiment would have to pass, first as a recruit, and next for advancement to permanent promotion, which he could only get if reported fit for it in the depot. Squadron commanders would send their smartest men as acting duffadars to the depot, and those only they consider likely to turn out good and efficient non-commissioned officers as it would be through the depot that *their own supply* of non-commissioned officers would come.

The great stimulus which this system would give to all ranks, both commissioned and non-commissioned, to do their best is self-evident, and requires no comment nor need one point out the fact, that commanding officers would have better opportunities of judging the qualifications (or otherwise) of their men before granting them permanent promotion to *all the various ranks*, during their period of probation in the depot.

The present rate of pay and that entailed by this scheme are shown

(d). Pay.

in Appendix A, by which it will be

seen that the total increase of expenditure to the state is Rs. 543, per mensem, solely due to the increase of a British officer.

A regiment would proceed on active service with 9 British

(e). Field Service.

Officers, 12 Native Officers and 492 rank and file, *viz.*

A Commandant.

A 2nd-in-command.

An Adjutant.

and

3 squadrons of	{	2 British officers.	}	Each.
		4 Native do.		
		4 K. Duffadars.		
		16 Duffadars.		
		144 Rank & file.		

The cavalry regulations allow for squadrons of 4 troops of 16 files each, or a total of 128 rank and file. In the above squadrons we have 164 in the ranks, that is 36 more. Taking, however, into consideration the rapidity with which casualties occur, even at the beginning of a campaign, and the number of men detached on various duties, this excess number would rapidly disappear. Then it must be borne in mind that the squadrons we may be opposed to are of a strength of 150 sabres.

ADVANTAGES OF THE SCHEME.

These are as follows :—

- 1.—No change in the present strength of regiments.
- 2.—No pecuniary loss to, or reduction in the grade of, any British officer, Native officer, or rank and file.
- 3.—It practically necessitates no change in the organization of 3 squadrons per regiment.
- 4.—It facilitates the proper training, and the looking after, of the recruits, who would be *all together* in the depot under the immediate command of an officer (assisted by the Adjutant in peace time, and by the Quartermaster, if this additional officer is also sanctioned), instead of being scattered in all the 4 squadrons as they are at present.
- 5.—Increased efficiency in all the squadrons.
- 6.—The depot, a 1st class training ground for *all ranks*, complete in *every respect*, and of the strength considered necessary.
- 7.—Peace and war establishments of both squadrons and depot *the same*, without interchange of a single individual, except the Adjutant the Woordie-Major, and 2 Ward Orderlies.
- 8.—Three strong squadrons in lieu of four weak ones.
- 9.—The addition of a 2nd-in-command to take the place of the commanding officer, two British officers in lieu of one to each squadron, and a Kote Duffadar per *field* troop to replace each Native officer ; more non-commissioned officers ; who are much needed.
- 10.—The assimilation of a brigade of Native cavalry to one of British cavalry.

DISADVANTAGES.

- 1.—Extra expense to the state of Rs. 543 p. m., as previously shown or Rs. 918 p. m., if a Quartermaster is also sanctioned (Vide appendix A.) Against these items may be placed the advantage of one (or two) British officers per regiment *in addition* to the present strength.
- 2.—The substitution of a depot for one of the four squadrons per regiment. In class regiments this would hardly cause any difficulty, but in class squadron regiments, one of the four classes would have to be absorbed, which could be effected by interchange between regiments or by gradual absorption.
- 3.—A dislike to serve in the depot. It has already been shown how this may be overcome.

DETAILS.

I.—The status of the Native officers to be raised as much as possible.

(g). Minor details.

These men have done excellent service, and there is no reason why they should

not do so again. Though usually most useful for many purposes (*viz.*, administrative, recruiting, &c.,) they are often somewhat lacking in the ability to lead troops in the field, *especially when given superior commands*. This is due in a great measure to want of experience. The senior native officers should therefore be given frequent opportunities of commanding squadrons in the field. The same applies to K. Duffadars with regard to troop commands.

II.—The title of Jemadar to be abolished, and another substituted. Head Bhisties, Sweepers, &c., are known as Jemadars, and Native officers naturally object to be similarly named.

III.—The present horse price to be raised to Rs. 250. A pecuniary aid from Government *without interest* being sanctioned on application.

IV.—A free pass by rail to and from their homes to be granted to men proceeding on sixty days leave (not less) *during the leave season only*.

V.—Furlough to be reduced to six months, from 1st April to the 30th September each year, and three leave seasons of sixty days each from and to the same dates.

The drill season is usually over by the end of March, and if men were allowed to go away then, returning by the end of September, they could be put through a course of fifteen days riding school before their squadron training began on the 15th October, instead of having to do this during the course, which often necessitates leaving other subjects undone or but indifferently done.

APPENDIX A.

<i>Present rate of pay.</i>	<i>Per mensem.</i>	<i>Proposed rate of pay.</i>	<i>Per mensem.</i>
1 Ressaldar Maj. @ 300...Rs.	300 0 0	1 Ressaldar Maj. @ 300...Rs.	300 0 0
1 Ressaldar @ 250... "	250 0 0	1 Ressaldar @ 250... "	250 0 0
2 Do. @ 200... "	400 0 0	1 Do. @ 200... "	200 0 0
1 Ressaidar @ 150... "	150 0 0	1 Ressaidar @ 150... "	150 0 0
1 Do. @ 135... "	135 0 0	1 Do. @ 135... "	135 0 0
2 Do. @ 120... "	240 0 0	2 Ressaidars @ 120... "	240 0 0
1 Woordie Maj. @ 150... "	150 0 0	1 Woordie Maj. @ 150... "	150 0 0
2 Jemadars @ 80... "	160 0 0	2 Jemadars @ 80... "	160 0 0
2 Do. @ 70... "	140 0 0	2 Do. @ 70... "	140 0 0
4 Do. @ 60... "	240 0 0	3 Do. @ 60... "	180 0 0
64 Duffadars @ 42... "	2,688 0 0	64 Duffadars @ 42... "	2,688 0 0
8 Trumpeters @ 38... "	304 0 0	10 Actg. Duffadars @ 38... "	380 0 0
536 Sowars @ 31... "	16,616 0 0	8 Trumpeters @ 38... "	304 0 0
		528 Sowars @ 31... "	16,368 0 0
625	Rs. 21,773 0 0	625	Rs. 21,645 0 0

SCHEME FOR THE ORGANIZATION OF NATIVE CAVALRY REGIMENTS. 412

<i>Add Staff pay of</i>			<i>Add Staff pay of</i>		
8 K. Duffadars at	9...Rs.	72 0 0	1 K. Duffr. for depôt at	9...Rs.	9 0 0
8 Pay Sowars at	6...,,	48 0 0	1 Head R. Rider do. at	9...,,	9 0 0
			12 K. Duffrs. with Sqrs. at	5...,,	60 0 0
			12 Pay Sowars do. at	4...,,	48 0 0
			1 Head Actg. Pay Duffrs.		
			for depôt at	6...,,	6 0 0
			1 Asst. Pay Sowar at	4...,,	4 0 0
TOTAL Rs. 21,893 0 0			TOTAL Rs. 21,781 0 0		

Showing a saving of (21,893—21,781) Rs. 112 per mensem.

Against this must be placed the pay and staff pay of one extra British officer as previously shown, *viz.*, Rs. 655 per mensem, or a total increase of Rs. 543 per mensem per regiment. Should it be deemed advisable to have a Quarter Master as well (thus adding *two British officers per regiment* to the present strength) Rs. 375 per mensem must be added to the above amount, making a total increased expenditure of Rs. 918 per mensem per regiment.

N.B.—The Quarter Master to be attached to the depôt.

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- * One with the depôt.
 - † Four do.
 - ‡ All depôt Duffadars.
 - § Two with the depôt.
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MOUNTAIN WARFARE AS APPLIED TO INDIA.

By Captain F. C. CARTER, Northumberland Fusiliers.

*“Scribimus indocti doctique exagia passim.”**

Divided into sections under following headings :—Subject—Historical Retrospect—Preparation—Concentration—Base—Medical—Sanitary—Transport—Marches—Night Marches—Advanced Guards &c.—Defiles—Attack—Defence—Outposts—Shelters—Roads—Signalling—Rifle and Gun Fire in hills—Boats—Bridges—Political and Intelligence—Conclusion.

The subject of mountain warfare is one that claims, as regards our army in India, more than usual interest; in fact, “warfare as applied to India” might be classified, with, but very few exceptions, as almost exclusively “mountain.”

The history of our Indian possessions for the last eighty years is prolific in examples of mountain warfare carried on across the frontier, and furnishes ample material for the student of this branch of a soldier’s profession.

The year 1814, during the administration of the Marquess of Hastings, saw the first expedition of any importance undertaken against mountain tribes. It was during the autumn of this year, owing to the attack by the Goorkhas in the previous spring on the police Thanas at Chitawa, Bisourah, and Sourah in Butwall, and disturbances on the Champarun frontier, that Lord Hastings decided on an invasion of Nipal territory. The lessons to be learnt from the campaign that ensued are (except perhaps as regards General Ochterlony’s division) of a decidedly negative character. The art of mountain warfare in the east was in those days, comparatively speaking, unknown to us, especially as regards a country of the physical and geographical peculiarities of Nipal; for the small and very unsatisfactory expedition against the Goorkhas in 1767 under Major Kinloch was useless as a guide, excepting that it showed only too clearly that for successful operations in these hills the season of the year chosen, namely the beginning of October, was much too early; and but little, and that little of but diminutive strategical or tactical value, was known of the details of the Goorkha invasion of Sikkim in 1787. Experience therefore in this description of warfare had yet to be learnt.

* This Essay was placed first by the Referees but was disqualified from taking the Gold Medal under condition 2 of the Prize Essay competition

A long course of uninterrupted and easy victories in the plains, from the days of Clive to those of Lake, had bred in the minds of British officers and men alike a contempt for Orientals, against whom it was thought they had only to show a bold front and a dashing advance, to ensure demoralisation, defeat, and rout on the part of the enemy. Finding themselves in 1814, however, suddenly launched into a diversely different species of warfare in thick jungles and on mountain peaks against foes inured to this kind of warfare, and of a far superior morale to that of their late antagonists, it was but a very short time ere experience proved that the tactics employed on the plains were not adapted to the hills. Operations commenced with a lamentable want of common sense and caution on the part of the commanders, bordering in some cases on foolhardy rashness. The result was pitiful in the extreme, and led to a succession of defeats and loss of prestige to our arms (notably in the case of General Gillespie's futile attacks on the position of the Goorkha General Balbahadur at Nalapani). The spirits of the troops, commanders and commanded alike, dropped like lead from the zenith of rashness and a firm belief in their own invincibility, to the nadir of over-caution and painful vacillation. The one redeeming point in the campaign is the series of carefully planned and successfully undertaken operations of the Loodhiana division under General Ochterlony, culminating in the defeat of Bhugti Thapa at Deothul. Had our enemy been imbued with more dashing enthusiasm, there is but little doubt that the results of this war would have been disastrous in the extreme to the British Rule in India. As it was, the Goorkhas "were abundantly satisfied with repulsing an attack or cutting off an outpost. They never pushed their successes beyond this, and were indeed too deficient in military science, as well as in physical means, to assume a superiority in the campaign, or to act offensively against any of our divisions."* Consequently the war was brought to an end owing to the successes of one, and in spite of the failures of three, of the generals employed, without the disasters that might well have occurred, not only within and on the borders of Nipal, but throughout the independent portion of India.

To say that the campaign was useless as a guide and exposition of mountain warfare is fallacious, and it is very necessary to properly appraise the value of the deductions to be drawn from this war; though, as before stated, the lessons learnt were of a distinctly negative order, and clearly manifested to those in authority what it was necessary to avoid rather than to adhere to in the future. The principles of advanced guards,

* "History of political and military transactions in India during the administration of the Marquess of Hastings, 1813-23," by H. T. Prinsep, B. C. S. 1872.

flanking parties, reconnaissances, the use of stockades, the effect of threatening the line of retreat of one's adversary in jungle and mountain warfare, were all brought clearly and forcibly to notice; and, though in the second campaign in 1816, General Ochterlony was, if anything (doubtless under the impression that by that time his Bengal troops were more "*aguerri*" to this kind of fighting), more inclined to the rash than the over-cautious (*e. g.* his turning movement by the Chakri Mukri Pass), still the instructions derived from experience of the previous year were not abused.

Leaving the northern frontier and turning to that of the north-west, the action of Pollock's, Sale's, and Nott's forces in the Khyber, Jugdulluck, and Maidan passes, are examples of cases where, owing to the ordinary precautions, so essential in mountain warfare, of crowning and clearing the heights before troops entered the defiles being taken, the enemy were utterly defeated and routed. Touching, however, on this point, the result of neglecting these precautions is also exemplified in the losses suffered on the return march by McCaskill's rear guard under the command of Brigadier Wild when passing through the Khyber.*

Not only in India, but in divers parts of the world, were our soldiers becoming by degrees inured to mountain and jungle warfare. The Kaffir War of 1850-53 showed that, when properly led, "the British soldier was a match for the savage anywhere, in the bush or out of it;"† and that warfare in mountainous and jungly countries could with proper forethought be successfully carried out by the British forces, is amply exemplified in the small but well conducted operations in Sikkim under Lieutenant-Colonel Gawler in 1861.

Perhaps, however, as an example of what can be done by troops, even under adverse circumstances, when led by an able commander, whose knowledge of his enemy and their tactics is only surpassed by his entire confidence in the fighting and enduring powers of the troops under his command, Sir Charles Napier's expedition against the Bugtis in 1845 is worthy of more than ordinary consideration. To those who are interested in the doings of the Conqueror of Scinde and Hero of Meanee, the following extract from an account of this expedition by his brother, Sir W. Napier, K. C. B., would not be out of place, I think, when discussing mountain warfare as applied to India :—"Sir Charles Napier, had crossed a desert of more than eighty miles; had surprised the enemy's first line of forts and watering places; had seized their strongest passes without a stroke; had baffled all their counter-schemes; and in fifty-four days subdued tribes having

* History of the war in Afghanistan, by J. W. Kaye. London 1851.

† Remarks on the war by Colonel Eyre, commanding 73rd Regiment in the Kaffir war.

four times his number of fighting men, without giving them the opportunity of delivering battle in an advantageous post. He had starved them where they thought to starve him, and by fine combinations and unexampled rapidity over-reached them in their own peculiar warfare, and in a country 140 miles long, and from 80 to 120 broad, and of such desolate strength and intricacy as can scarcely be equalled in the world—chasing them amidst crags and defiles, where a single error would have caused the destruction of his army merely by the casting of stones down on the column.*”

In December 1849 our forces were again on the war path against the Buzai villages, and owing to the careful dispositions of the commander, Lieutenant-Colonel Bradshaw, C.B., the operations culminated successfully at the action at Palli. February 1850 saw yet another flying column against frontier tribes in the Kohat District under Brigadier Colin Campbell, and the success of the operations was fully endorsed by Sir Charles Napier, then Commander-in-Chief in India, who accompanied the force.

Since then, our frontier having extended to the hills all round our Indian possessions where not bordered by the sea, there have been continuous little mountain wars thrust on us owing to the turbulent nature of our neighbours and their warlike and predatory habits. Mohmunds, Ranizais, Bhutias, Utman-Khels, Burmans, Afridis, Hindustani Fanatics, and a score of others, have felt the argument of British steel across their frontiers.

Passing over some score or more expeditions since the days of Sir Charles Napier, we find one that abounds with thrilling episodes of hard fighting, desperate losses, and daring heroism, namely the operations of the Yusufzai Field Force in 1863 under Sir N. Chamberlain, more commonly known as the Ambeyla campaign.

The account of this expedition† teems with examples of the difficulties and uncertainties of mountain warfare as applied to India. In the first place, when the expedition started it was not expected that the Bonairs or Swatis would join in the rising against us, it being well known that, as followers of the Akhund, they were at that time by no manner of means well disposed towards the Hindustani Fanatics (Wahabis), who, having again occupied their stronghold at Sitana, were the real cause of the outbreak of hostilities. Yet no sooner had the force arrived at the foot of the Ambeyla Pass, than it was evident that not only had the Bonairs joined the league against us, but that there was

* History of Sir Charles Napier's administration of Scinde and campaign in the Cutchee hills, by Lieutenant-General Sir W. Napier, K. C. B. 1854.

† Vide “Record of expeditions against the N. W. Frontier tribes,” Paget and Mason. 1885.

a regular hostile gathering of the tribes both Cis and Trans-Indus. Here then occurred one of the uncertainties that are coincident with mountain warfare. Instead of, as had been decided, attacking the Hindustanis from the north of Mahaban with our backs to the friendly (?) tribes in Bonair and Swat, it was found that to adhere to this plan of operations in the face of this enormous coalition was impossible, and the whole aspect of the campaign became suddenly changed.

For fifty-four days, from 22nd October to 15th December, did our army, acting against fearful odds, stand at bay on the position chosen at the Ambeyla Pass, during which time there was scarcely any cessation of hostilities. Over and over again were our advanced piquets, attacked by the ever swelling numbers of the coalition, as reinforcements came over the hills flocking to the Akhund's standard. No less than three times was the famous Crag Piquet, taken and retaken, and the Conical Hill, Eagle's Nest, and Water Piquet, were all scenes of desperate hand-to-hand fighting, during which many a brave soldier laid down his life, and many a brow earned laurels that time can never efface from the history of our wars in India.

Still, in spite of the enormous losses inflicted on the tribes, and dissensions that sprang up amongst them, victory, lasting and sure, never crowned our efforts until on the 15th December, after nearly eight weeks of defensive resistance, our forces under Major-General Garvock (who had relieved Sir N. Chamberlain on the latter being wounded) assumed the offensive, and moved down into the Chamla valley, defeating the enemy at Lalu and Ambeyla, thus breaking up the coalition and attaining the original object of the expedition, namely the destruction of Sitana, by coercing our late opponents the Bonairwals (accompanied by a few British officers and escort) into moving down on Sitana and destroying the stronghold of their former allies with their own hands.

These operations cost us a loss of 238 killed (including 15 British officers), and 670 wounded, total 908; and "taught us the impolicy of penetrating an unknown mountainous region with a heavily and hastily equipped force, of which Europeans must necessarily form an important portion, and the operations of which must be further impeded by the difficulties attending the movement of artillery, stores, and baggage in a rugged country, without roads, and in the face of a determined enemy thoroughly acquainted with the ground and inured to mountain warfare."

It also clearly portrayed the immense disadvantages of the defensive, and the equally immense advantages of the offensive, when dealing with Asiatics.

* "Sitana.—A mountain campaign on the borders of Afghanistan. By Col. J. Adye, R.A., C. B.

It also pointed to the absolute necessity for the organisation of an efficient Intelligence Branch at Army Head-Quarters (*example*, the misleading information regarding the country, and particularly of the road from the Surkhawai Pass to the Chamla valley, with which the force started from Nawa Kila); and forcibly showed the utter folly of having a political officer working independently and without the knowledge of the Commander-in-Chief or General commanding the force (*e.g.*, Major James' secret treaty with the Swatis).

The above may be said to be the chief lessons we learnt on matters to be avoided in the future. But at the same time, though doubtless avoidable errors in judgment were not few, the Ambeyla expedition of 1863 shines out brilliantly, among a long list of our frontier wars, as blazoning forth what can be, has been, and will be done, should necessity again arise, by the indomitable energy and bulldog pluck of the British soldier and his dusky brother-in-arms; for never have valiant deeds deserved the honor in which they are held more honestly and rightly, than those enacted in the famous struggles at the "*katlghar*."*

1863 did not, however, see the end of our frontier struggles any more than 1893 will, for year by year the spirit of restlessness is abroad, and the Government of India has perforce again and again to take up the cudgels on the frontier. A dozen or so more petty wars around our mountain border brought us to 1878, when the long drawn out struggle in Afghanistan, commencing with all the drawbacks of 20 years immunity from wars on a large scale, insufficient transport, faulty equipment, penny wise and pound foolish policy, and inefficient leaders, ended at length in a series of brilliant exploits crowned with the victory of Kandahar; and, produced, as war only can produce, able leaders and trusted commanders, under whose guidance the army in India has since 1880 entered on a new era, the results of which on a small scale are visible in the organisation, despatch, and conduct of the ever recurring little mountain wars that have cropped up since that time.

Experience moreover in this particular subject is not lacking. From a cursory glance at the army list it will be seen that an extraordinary large percentage of officers of all ranks have smelt powder and heard the whiz of a foeman's bullet on our Indian frontiers, where the wild tribes from Beluchis and Pathans to Tibetans and Kukis hold sway over their patchwork domains and fastnesses, that "march" with the rugged borderlands which form the framework of our empire in the east. In dealing therefore with a subject such as this, the inferences and deductions may with advantage be drawn from the history

* *Angloé*—"Place of slaughter." By which name the Crag Piquet has since been known among the tribes.

of our frontier wars in India, and actual experience across the border during the last few years.

The subject of "Mountain warfare as applied to India" is, however, one that embraces so many different and varied questions, that I have thought it as well to discuss the several data connected with it under various minor headings, before dealing with the whole question in its entirety.

"*Semper paratus*" should be the motto of the Government of India with regard to its arrangements for war across our frontier, for there is no conceivable means of telling when the inflammable material that forms the border to our Indian possessions may through some unforeseen occurrence suddenly ignite. One only has to look back to the outbreaks at Manipur and on the Samana in the spring of 1891, and the more recent development of affairs in Chitral, on the Pamirs, and in the Kuram valley, to become thoroughly convinced of this truism. Therefore it is *de facto* imperative that we should be able to mobilise and despatch an expeditionary force for mountain warfare on the shortest notice possible.

The most difficult nut to crack on the occasion of several mountain expeditions starting about the same time is undoubtedly the supply of mules. It is in some cases impossible to use plains camels on our mountain wars save up to or just beyond the actual base of operations, and this entails the distribution, when camp equipage is taken, of transport to corps on very nearly "obligatory mule scale."* I will allude to this knotty point more in detail under the head of "transport."

Another important factor in our preparations for mountain warfare is the question of supplies. We are not like other European nations, who war chiefly in civilized countries, where railways, supplies, and houses are available. In our case transport, clothing, shelter, and supplies all have to be provided at a moment's notice. As regards the first, I will discuss that further on, and, provided the schemes elaborated in peace time have been carefully worked out, there should be no hitch with regard to the second and third. The fourth item takes time. It is naturally out of the question to move troops to the base if you have nothing to feed them on when you get them there, and as the supplies obtainable on our frontiers are (with perhaps the exceptions in some cases of Indian corn, rice, bhussa, grass, and firewood) few and far

* Vide Field Service Equipment tables, 1891, Section viii, table xii, page 13, 2nd alternative scale.

between, the majority of stores have to be transported from the nearest commissariat godowns to the base of operations. It stands to reason, therefore, that in order to carry this out and to give necessary orders to camel and cart contractors, purchasing agents, and others, the commissariat department should have the most timely warning of the intentions of the Government of India. Until they are in a position to feed the force to be employed from the base onwards, it is useless sending up dribblets of men (except those, such as Sappers and Miners or Pioneers, actually required for work at the base) to eat up the food as it pours into the base.

The General detailed for the command should have at the outset *carte blanche* to requisition for and obtain from ordnance, medical, military works, or commissariat departments, any articles extra to the ordinary field service scale stores or establishments, such as strong picks, shovels, and crowbars, extra Begbie lamps, extra conservancy establishments, all of which in hill warfare are essential for the successful carrying out of the expedition. All the arrangements for camp at the base, base hospitals, encamping grounds *en route*, should be perfectly cut and dried, and no detail left unprovided for 'ere corps start.

Should the foregoing details have been carried out in a satisfactory manner, and all necessary orders
 Concentration at the Base. as to dates of arrival at base, route, etc., have been issued, there should be no hitch whatever in timely concentration of the force at the base from whence the advance into the mountains would take place.

Every corps on its arrival should be shown its encamping ground, the position where the latrines are to be dug, the water supplies both for cooking, washing, and watering animals, the general direction of the line of advance and the position of the piquets. Brigadiers and their brigade-majors, who should, if possible, arrive at the base before or on the same day as the first unit of their brigades, will, under the orders of the General Officer Commanding through the Assistant-Quarter-Master-General or Deputy-Assistant-Quarter-Master-General of the force, see that this is done. Above all things stringent orders must be issued with regard to the custody of rifles at night, as the rifle thieves and their accomplices, many of whom often obtain employment on roadwork, commissariat, etc., on the concentration of a force against tribes in the neighbouring hills, are at this of all times more alert than ever with a view to increasing the armed resistance of the tribes against whom the force is to move. Buckshot cartridges should be issued to all sentries in addition to ball : this was done in the Black Mountain in '91 and in Lushai in '89.

On the arrival of the General Officer Commanding the force at the base of operations (and in the case of communications, operations in the mountains on a large scale, before the concentration takes place), an officer to superintend the lines of communication, under whom would be Road Commandants of sections, Engineers of base depot, and other officers connected with the lines of communication, will be appointed.

In the majority of cases, however, of mountain warfare in India, where the whole force but rarely exceeds seven or eight thousand men, the duties connected with these appointments can be carried out, previous to the general advance, by the staff officer (Quarter-Master-General's Department), who should, when all preliminary orders have been issued relating to the starting of units for the expedition, proceed at once to the base of operations.

The orders with regard to the above appointments are clearly laid down in the field service manual (as yet unpublished, but the manual of instructions for "Lines of communications in the field, 1889" gives the main points). These in all cases will, as far as general maxims are concerned, be followed, with such variations as local circumstances may render necessary in mountain warfare.

However complete may be the organisation, equipment, and morale of our troops engaged in mountain warfare, they all will avail but little if the medical and sanitary arrangements of the force are wanting. History abounds with examples of the fearful havoc caused on active service by incomplete and insufficient medical arrangements. In the records of our frontier wars in India it is by no means difficult to recall cases, where owing to lack of experience, false economy, or insufficient personnel and material in our medical arrangements, the whole object of the expedition has been within measurable distance of general collapse.

In treating with this heading it is as well to consider all points that the Medical Staff have any dealings with in hill warfare. These include not only the actual physiology and surgery necessary, but also the means of keeping the men in health, their transport when sick or wounded, their food, clothing, and to a great extent their sanitation; and in these matters certain *special* arrangements are necessary in mountain fighting.

As regards the purely professional part of medical organisation, it does not differ very materially from ordinary active service under other conditions. The present system of field and base hospitals has had a very fair trial, and with one or two exceptions has not been found wanting. The chief modification required in the system, when working in a mountainous country, where the force is apt to be scattered over a considerable area, is that there

should be no hard and fast division and distinctions, as field hospitals for "British troops," "Native troops," and "followers." With the amount of personnel and material available such an arrangement, in our *small* frontier wars, is impossible and irrational; for it has been found that the sections, whether originally detailed for one class or the other, must deal with all cases within reach, whether Europeans or Natives, troops or followers; and this is what has practically been done of late years, though it is not officially recognised.

Another great tendency to be avoided is the "cutting down" of medical staff and the number of hospitals required for hill campaigns, a tendency that has no doubt arisen partly from motives of economy, and partly from the healthy state the troops have generally been in during our late wars. Take for example the Black Mountain Expeditions of '88 and '91, both Miranzai Expeditions in '90 and '91, and Zhob valley field force of the same winter. The danger of such false economy was, however, clearly shown with the Isazai field force 1892, when owing to fever, sunstroke, and cholera following on an attempt to reduce the hospital establishment, the resources of the medical department with the force were severely taxed.

Having succeeded so far, the next question in mountain warfare is the best means of carrying wounded men, either along with the party, when it is not *possible* to send them back at once, or back to the nearest hospital; and this is a matter that has not been satisfactorily settled as yet. The stretchers now in use are by no means suitable for steep hill sides, as there is absolutely nothing to prevent the sick man from sliding off the canvas, either in front, on rear, or on either side, when being carried up or down a steep incline. On two occasions, even when carried with the greatest care, I have seen this happen to a wounded man, thus endangering life and causing fearful and unnecessary pain. The system of strapping the patient into the stretcher is open to grave objections. Better than this is the arrangement of a blanket stretched on two rifles or bamboos; this was used as an experiment with some success at Diliari, Derbandrai, and Kund in 1891, and was preferred by the troops to the brown canvas stretchers as issued. It strikes one, however, that a more *portable* and more comfortable means of carriage for wounded men over precipitous ground might well be considered. The present stretchers are unwieldy and cumbersome to carry when not in use, and are not much better when actually unfolded and in use. Some sort of arrangement consisting of merely a net or canvas hammock (vide sketch marked A), carried with or without pole, over which the man's coat or a blanket can be thrown, would appear preferable, and has the distinct advantage

of being *really* portable. I do not know if this has ever been tested on service—after all it is but modernising the old idea of the infantry sash—but I have seen an ordinary string hammock used over bad ground in Kashmir for this purpose with marked success. The litter of poles and raw hide or rope (the body part of a hill man's charpoy (bedstead) for instance), as suggested by Lieutenant G. C. Doane, 2nd Cavalry U. S. A., in 1876* (vide sketch marked B), would be an improvement on our present article, as it gives more to the weight of the patient, and there is considerably less chance of the wounded man sliding out on to the hill side or down the khud. The stretcher designed by Major-General H. P. Prendergast, R. E., C. B., V. C., (now Sir H. Prendergast, K. C. B.) is suitable, and has been found to answer well in Burmah and Lushai. For carriage of sick and wounded along mule paths Deputy-Surgeon-General Collis' improved Lushai dandy (71½ lbs.), and mules with ordinary "*palana*" (Punjaub native saddle) and stirrups, are the most suitable for mountain warfare in India.†

As regards the clothing of our troops and followers in mountain warfare, experience, dearly bought, has shown that it is folly to save a few lbs. weight in the matter of transport at the risk of incapacitating our fighting machine or its followers owing to want of proper clothing. To keep a man in a proper state of health fit for any emergency he *must* be properly clothed, and have with him sufficient spare clothing for a change of some sort in wet weather and for use at night. Neglect of this precaution was met by evil results during the winter of 1879-80 at Kabul. In a despatch dated 8th December 1879 General Roberts alludes to the insufficiency of warm clothing for the men, and states that on account of the bitter cold "lung diseases are on the increase;" and, when early in December, snow began to fall heavily at Sherpur, the state of the insufficiently clad troops was enough to cause anxiety to the most sanguine of commanders. Had forethought and prudence stepped in beforehand instead of at the eleventh hour endeavouring to obtain, at ruinous prices, poshteens from the Persian Government, this state of affairs might have been avoided. Still more marked and far more disastrous was the state of the transport coolies of the Lushai field force 1871-72, especially during the operations at Tipai Mukh and the advanced posts. Everything depended in this campaign on the sufficiency and working capabilities of the transport coolies, as nearly the whole of the stores had to be transported by coolies, the country being for the most part quite unsuited to mule transport, even had the large amount of mules required been available. The result is fully known. The coolies died like sheep along

* Vide War Dept. Surgeon-General's Office U. S. A., circ. No. 9 of 1877.

† Vide A. R. I. Vol. X, p. II, Appendix XXXIV.

the road side,* exposed to fearful vicissitudes of temperature by day and night, in a country where (to quote the words of the P. M. O. of the force) "the dew pours from the trees like heavy rain," where the hills and forests are clad throughout the night and for a great part of the day in a mantle of thick malarious vapour, depressed, overworked, badly fed, and (owing to the enormous number of sick and the paucity of medical officers) with very little opportunity of obtaining medical relief, is it to be wondered at that the mobility of the force was at one time strained to its utmost?

Compare the results in the way of admissions to hospital, due to climatic influences and insufficient clothing in '71-'72 and '79 with similar admissions on the Samana (where the men had poshteens and jerseys) in the winter of '90, and on the Black Mountain during the heavy rains of March '91 (jerseys were part of each man's kit), and a lesson stands out in large and clear type on the necessity of good and ample clothing for troops and followers in our mountain wars. There is one point, however, that still needs pressing home, and that is the necessity for the issue of cardigan waistcoats (or jerseys for preference) for field service kit at *all* seasons whether on summer or winter scale. Nights are often chilly in the hills in summer time, and a woollen jersey to a man just returned from a long day's work, means probably the avoidance of chill or pneumonia.

To those who remember the first day's sunshine in bivouac after four days heavy rain in one of our late frontier wars, and the spectacle of a Highland regiment clad in jerseys, *their lower extremities through the sleeves*, proceeding to dry their only available nether garment, *viz.* the kilt, the impression then created that the jersey can be put to more uses than one, and is as invaluable from April to October as from October to April, for rainy as well as for snowy weather, has doubtless remained. Regarding 'shelter' for man and beast, I will deal with it under the head of "camps and bivouacs" and "transport."

There is not much to be said regarding "food", that affects war in mountainous countries more than elsewhere, save that as the weather is more variable, the "extras," rum, tea, sugar, cocoa, &c., &c., which can be issued on the order of the G. O. C. the force, are more frequently required. Our arrangements during the last few frontier wars as regards the feeding of the men and more particularly as regards *proper assortment* of food, have received the much required attention they needed.

* The ratio of deaths from disease per 1,000 per annum among the Hindustani and Punjabi coolies was 160.95; among the hill coolies 712.25.

† Vide Report of Deputy-Surgeon-General Buckle, C. B., P. M. O. to the force, and paper by Surgeon-Colonel R. Harvey, D. S. O., P. M. O. of P. F. F., in Journal of U. S. I. of India, March 1892.

Tinned meat should be available in 2 lb. as well as 6 lb. tins for use of officers and men on detached duty. A tin opened is apt in sultry weather to go bad in a day or two, with the result that the owner starves for four days may be !

Closely allied to questions medical, come those of sanitary importance, dealt with under the heads of conservancy and encampments. Here the **Sanitary.** Quarter-Master-General's and Medical Departments work hand in hand, each in their own province, towards the desired consummation, *viz.* sound sanitation.

To detail all matters connected with the sanitation of a force in the field would be out of place and impossible in a paper of this length; suffice it to say that in mountain warfare, owing to the nature of the hills, the density of the jungle, or the ever vigilant attitude of our foes, it is necessary for our camps and bivouacs to be confined within far closer limits than when fighting in the plains, and this alone necessitates a far more careful inspection of "*minutiæ sanitatis*" than is otherwise required.

Take for instance a campaign in Sikkim, Lushai, or on our north-west frontier. All ideas of laying out camps as shown in "regulations for encampments" are at once discarded. Where on the plains with ample space we should put one regiment, in hill campaigns we probably have to arrange for the camps of three.

This alone necessitates special arrangements for conservancy. Then, whereas on the plains, when requisite, camps can be shifted may be a mile or so away to fresh ground, in the hills the probabilities are that there is no fresh ground available; and thus every endeavour must be made to keep the ground well ventilated and dry by opening up the tents by day, or when necessary by striking them altogether, in order to let the rays of the sun penetrate the soil where the men sleep. Drains should always be dug round the tents, not indiscriminately, but under the supervision of one officer per corps, who should see that the drainage of his camp is carried out on a proper system. Only by doing this will accumulation of water in parts of the camp be avoided.

Latrines should be dug as far away from the camp or bivouac (to leeward of the prevailing wind, if possible), as is compatible with the nature of the ground and the safety of the men, and, except in the hospitals, no latrines of any sort should be permitted by day within the limits of the camp. The usual system of earth latrines, *i.e.*, 3" of faecal matter and 6" of soil, should be carried out, varied to a depth of 1' 2" in places where the slopes of the hills are steep. When camp or bivouac remains in any one place for a lengthened period, burial should, if possible, give way to cremation, and as firewood is usually abundant on the hill sides

this matter should receive more attention than has hitherto been accorded it. Where occupation of a country becomes necessary, as for example Cabul in 1879, Fort Lungleh in 1889, Seri, Nimal, and Samana in 1891, arrangements should be made for the erection of cinerators, thus getting rid of any chance of germs of disease spreading from the covered in trenches, when the rains set in.*

At night, when the enemy are capable of creeping up close to the piquets or borders of the camp, and it is unsafe to proceed to the day trenches, special night trenches must be made, and the filth must be *carried away* from these to the day trenches at daybreak, so as to avoid soiling the ground, and plentiful allowance of disinfectants is imperative. This system was followed in the Black Mountain in '88 and '91 and Lushai in '89, and answered well, with but one exception, and that was that the establishment of sweepers allowed in the Field Service Equipment Tables, though sufficient for work in the plains or in large valleys, was found to be unable to cope with the extra work thrown on them in the camp, mule lines, and at the trenches, when bivouacked or encamped on mountain ridges. That this has been recognised more or less, is apparent from the fact that for the Miranzai and Hazara field forces of 1890-91, the establishment of sweepers was, as a special case, increased. (British regiments for example received 12 in lieu of 8 sweepers).

Rubbish, refuse, litter, &c., should, when possible and if weather permits, be burned and not buried, as burying on the hill sides is unsatisfactory as well as insanitary.

Finally, more particularly in mountain warfare, when at times the supply of water is scarce, the greatest care should be taken that the sources are not defiled, also that water for drinking and cooking brought from springs is not carried in the same *mashaks* (goat skin for carrying water) that have been used for purposes of taking water from stagnant pools for animals. In very few cases in mountain warfare is it necessary to boil or filter the water, which as a rule is obtained from springs in the hill side; but when the supply, owing to unavoidable reasons, has to be taken from pools and sluggish running nullahs, where cattle have been watered, one or other of these precautions should be taken.

As regards the lines of transport animals, for reasons of safety it is usually necessary to have them within the limits of the camp, but during the day time, when possible, all animals not actually required for duty should be moved out to standings well away from camp or bivouac, so as to open out the ventilation

* For description of a suitable cinerator, vide "Sanitation in India," by Lieutenant-Colonel G. Young, 24th. P. I.

during the day and prevent the soil getting polluted beyond the power of even King Sol and an army of sweepers to rectify. Bazars and lines of native followers, cooped up as they are often obliged to be in a very limited space, require a deal more supervision in mountain warfare than at other times. The necessity of ordinary sanitary precautions does not appeal to a native, and the nearest nullah, no matter whether it is immediately above the water supply, strikes him as a more suitable spot for the wants of nature than the latrines prepared for his use. There is but one remedy for this evil, and, if used firmly and with discrimination, it generally has the desired effect. I allude to the powers of the Provost Marshal and his assistants on active service.

Perhaps the most difficult problem to solve, were our forces in India to be engaged in mountain warfare on a large scale, would be the question of transport.

The transport that has been employed by us up to date in mountain warfare consists of ;—

1. Country carts.
2. Transport carts.
3. Elephants.
4. Horses and ponies.
5. Bullocks and yaks.
6. Camels.
7. Mules and donkeys.
8. Coolies.

All the above, with the exception of yaks, were used during the Afghan war of 1878-80, though after just touching on items 1 to 5, I will confine myself principally to items 6, 7, and 8, which are really practically speaking, the only satisfactory means of transport (other than railway) for hill warfare.

Country carts are only suitable in the intervening valleys.

Items 1 and 2.

Transport carts are useful at the base also, and on roads with slight gradient. During protracted occupation of a country, when troops are quartered in valleys, they would be very useful, and can be moreover taken to pieces for purposes of transportation.

Elephants have, as we know, been employed on frequent occasions, in Afghanistan, Lushai, and the

Item 3.

Black Mountain. Perhaps the most astonishing work, as regards transport of stores by elephants, was that done when provisioning Lungleh (Lushai) in the spring of 1889, which was materially assisted by elephant transport. To watch these huge monsters literally feeling their way and crawling along in bad parts of the narrow tracks from Phirang to Fort Lungleh was a real eye opener to those who had not seen elephants employed on bad jungle paths before. If my

memory fails me not, we shipped altogether 32 elephants to Chittagong, where already six had arrived from Dacca ; and until later on, when the rains set in and mortality was rife amongst them (from "*chowrung*" chiefly), they did most useful work. Colonel Tregear in his report on the expedition of 1889, while admitting that, for newly-cut tracks and *kuki* paths, coolies only are suitable, speaks strongly in favour of the employment of elephants and mules on made roads for carriage of stores. Elephants are, moreover, in a country like Lushai easily fed. In 1868 it will be remembered that elephants carrying R. H. A. guns ascended as far as the Machai Peak of the Black Mountain without any casualties, and those who have made the ascent will admit that it is hardly an elephant track that leads up to this point, 9,800 above the sea level.

Here, however, the difficulties of feeding these huge quadrupeds are great, and I do not think it is probable that the attempt would ever be made again in a country like Hazara. Still, when it is considered that an elephant on fairly level ground carries 15 maunds, *i.e.* equal to the load of 3 camels, of $7\frac{1}{2}$ mules, and from 20 to 30 coolies, the carrying capacity of the beast is not to be despised. In Lushai they carried at first (being out of condition) only 5 and 6 maunds, but when in work managed to do very well with a load of 10 to 12 maunds; and I am quite convinced that, had it not been for the elephant transport, Lungla would never have been provisioned in time to permit of the flying column proceeding to destroy Howsatas and Jahutas villages on 15th March 1889.

Horses and ponies, bullocks and yaks, would only be employed

Items 4 and 5.

when mules were not available. Ponies and bullocks are regularly used by traders across our frontier, and travel well over bad country, but they are not so hardy, fast, or strong as mules (excepting perhaps the Shan bullock), and therefore can only be considered as an alternative. Should our wars take us over the hills to the "Roof of the world," yaks will play an important part in the transport organisation; they are strong, sure-footed, and hardy, though when caught on the hill side and pressed suddenly into government service, as had to be done by Lieutenant Stewart, 5th Goorkhas, when marching from Gilgit Pamirs in the autumn of '91, they are apt to object to their loads, to the get rid of them, and defy the fleetest hill man to catch them again.

It is impossible to imagine warfare from India unassociated

Item 6.

with the "*unt*," (camel) and we may safely say that whether we war in the plains or in the mountains, the "*unt*" (camel) will certainly form part of the force, though his services at times may have to be dispensed with at or near the base.

I am not aware what steps have finally been decided on by Government, in view to their being able to call up on emergency a large reserve of camels, but I fancy the subject has lately received consideration, and the mere fact that the Punjab alone furnished some 46,000 camels for the last Afghan war leads to the inference that the breed is not dying out.

There is a trait connected with this ruminant mammal, that seems to require further development. It is that the camel adapts himself in a most marked manner to the nature of the country in which he is bred. For instance, those bred in sandy plains suffer extremely from wet, cold, and rocky ground, but are impervious to heat; while those brought up on hilly ground, have the pads of their feet hardened, are accustomed to cold, steep hills, and rocks, but suffer from sunstroke. The majority of camels in India come under the first class, and from a perusal of the history of the last Afghan war it is apparent that many camels died from want of acclimatization, which might have been prevented to a certain extent had more care been taken in their selection for the different descriptions of work required.*

I am of opinion that Government should give grants of land in the hills to camel-breeders to start farms, and turn out a real hill camel suitable for mountain work, more of the stamp of the Bactrian as regards coat and feet. This idea I have been told is Utopian, but I think nevertheless that it is possible, or at all events, considering the enormous demand for hill transport, well worth a trial; and I look forward at some future date to seeing the embodiment of this "*Camelus Utopianus*" in the flesh, which should be a sort of cross between the *Bactrianus*, the *Dromedarius*, and the *Llama*.

Mules are the backbone of our transport for hill warfare;

Item 7. where a man can go it may almost be said a mule will find his way. A casual glance at the orders issued for the last half-dozen frontier expeditions will at once show what a very large proportion of mule transport is required. The primary result of this is that the mobilization mules of corps detailed in the general scheme (but not for the particular expedition about to start) are taken away from regiments, and packed off may be to the further extremity of our frontier for use there. This is apt to have, if the practice is continued, an injurious effect on the stable management of regimental mules in the future, as regiments do not naturally view with complaisance mules which they have trained and brought into condition, being, when they are probably just fit and in working order, transferred to other corps or presidencies, and their places filled up eventually by untrained mules in bad condition fresh from the dealer's hands. This may not seem to affect the

* Of the Punjab camels alone 39,000 died or were lost, and the total losses of camels in the campaign ran to something like 60,000.

question of "Mountain warfare as applied to India," but it is, I consider, owing to the large amount of mule transport required, that this point is more specially brought to our notice when our forces are proceeding on service in hilly country than on other occasions. The secondary result is that mules have to be found by hook or by crook, hired or bought in the districts; and this means time and probably delay, which in the case of frontier expeditions take for example the two cases quoted above of Manipur and Samana in 1891, may also mean loss of life and prestige; and holding the position we do as a European nation in the Orient, it is really an open question as to which is the most serious; the latter frequently follows the former, and the former not infrequently gives birth to the latter. The question therefore of an ample reserve of mule transport is one that requires thorough consideration. Government in the Military Department have had the matter in hand, but the long and short of it is that the difficulty lies in the usual channel, *viz.*, expense. An empire living, as our Indian empire does, well up to, if not over, its income, and with the currency dwindling down to next to nothing, must forsooth, if it means to remain solvent, consider the pounds, shillings, and pence of all *desiderata* brought to its notice.

That a reserve of mules could be obtained there is no doubt whatever. We can purchase them in India, Persia, Italy, Spain, America, the Cape, and other places; in addition to which there would be no peculiar obstacles to be overcome were a regular government mule-breeding establishment started, say in Kashmir or Kulu. The cost of *maintaining* them in peace time is, however, the stumbling block, and until the civil authorities see their way to overcoming the adhesiveness of red-tapism and the subjection of contractors' claims to the welfare of the empire by co-operating with the military authorities and using the reserves of mules during peace time for district and municipal work, any reform and advance in this direction must perforce remain in abeyance.

With mules may be classed donkeys, for those sturdy little animals that are hired in droves to make up the deficiencies of our mule transport are by no means to be despised. A good donkey carries his two maunds over the hills, and provided they are properly fed, they form a very good substitute or addition to the hybrid, though of course their pace is slow.

In mountain warfare under peculiar circumstances the only means of transporting stores is by employing an army of coolies. It is at best an unsatisfactory arrangement, but where the route taken is merely a track, or where the path has to be cut through impenetrable jungle, the employment of "*genus homo*" as a beast of burden is inevitable.

Item 8.

The great difficulty with coolie transport is the small amount they carry (20 seers in hills), and the fact that they have to carry food for themselves as well as the troops, in addition to their own blanket, waterproof sheet, cardigan, and cooking pots. Considering all this, the enormous length of a convoy of coolies is not to be wondered at. For a force of, say 1,000 fighting men, sent on an expedition for 15 days, a coolie corps of between 7,000 and 8,000 is necessary ; this alone is sufficient to damp the ardour of any commander keen on rapid movement. In addition to this there is the further drawback that the men die and desert, or get ill, or for some other reason become ineffective, and are useless as carriers, though they still eat up the food.

In the Lushai expedition of '89 we shipped 2,500 coolies for transport duties alone from India, in addition to those obtained in the Chittagong Hill Tracts, and yet the difficulties of getting the small amount of stores required for the hot weather garrison carried up to Lungleh before the rains set in were enormous. One point, however, which considerably added to the difficulties was the bad class of coolies that were sent, especially those obtained from the North-Western Provinces and Bengal ; many were old men or mere lads, and not a few sickly, and large numbers deserted before work began. It is most essential that every batch should be thoroughly inspected and weeded out by a medical officer before they start.

As regards food and clothing of coolies and drivers, I have dealt with that under the head " Medical", but in addition to the articles sanctioned, every coolie and follower with the force should be given some sort of weapon wherewith to defend himself and the convoy, if necessary, as also for purposes of cutting jungle.

To avoid the evils of sickness from change of climate, as many coolies as possible should be obtained locally from friendly chiefs ; and on the submission of hostile tribes, when work still remains to be done, the headmen should be *forced* to provide a quatum of coolie labour. In order to keep these labourers contented however, it is advisable to feed them and pay them a nominal sum in cash. The saving that would accrue to Government by the employment of local labour should reach a large figure.

Everyone who has had anything to do with coolie transport is well aware of the drawbacks to the system. Even as far back as 1861 we find the Officer Commanding Sikkim Field Force complaining of the unsatisfactory progress made with coolie transport. It should therefore be laid down as a rule that this description of transport should only be used when other kinds are impossible, and that as soon as roads can be made practicable for animals, mules, donkeys, bullocks, camels, or even elephants, should be employed in preference.

The above gives in short the different species of transport employed in mountain wars in India. As regards the loading of transport, there is not much to be said over and above what is laid down in the manual (Hayter and Kelly), and Commissariat Transport Field Service Code ; suffice it to add that in mountain warfare more than at any other time careful loading is required. Special care should be taken that the loads do not bulge out too much on either side, as with a six-foot track with sharp zigzags and rocky sides the delays and damage caused by loads getting caught on rocks or trees, and displaced, or, may be, rolled down the khud, are, when careless loading is done, frequent and dangerous, especially when troops are moving on the paths below.

Another point to be seen to is that the load is not pitched too high on the animal's back ; this in going up or down steep gradients is a sure means of producing sore backs. Mules should never on narrow paths in the hills be attached, as is usual, in threes; the result of this is that the animal cannot pick his way properly, and, may be, in a nasty place is pulled down by the mule in front or behind, and as likely as not goes over the khud, taking his two stable companions with him.

When occupation of a country takes place, and the rains are at all heavy, every endeavour should be made to arrange for cover for the animals in camp. The percentage of sick among the mules of the last Sikkim Field Force during the rains of 1888 ran up to 52 p. c., which General Graham attributed almost entirely to the want of cover.

There is one other kind of transport in hill warfare, which with us has not been turned to much use beyond our frontier. I allude to the railway ; and, without doubt, in our next great mountain war, if we mean to keep pace with the times and turn to some use our tremendous mechanical resources, we shall have to make large strides in this direction.

The question of course is what sort of railway should we employ, and this is a point open to discussion. For rapidity of laying and actual carriage of material, a "portable" railway, say two-foot gauge, strikes me as the most suitable. There are many cases in mountain warfare, especially in Afghanistan, where 10 to 30 miles or more between the hills might be covered with a line of rails, by which means a vast amount of time and transport would be saved. All the material of course would have to be carried up in parts, but the difficulties of rivetting trucks and engines at the base of the miniature line of rail could surely be overcome ; and the benefit would be very appreciable. Not only for supplies and stores could it be used, but for troops and sick as well.

A system of several sections of the road from Base to Front might be instituted. In valleys the rail would be used, where possi-

ble, plains camels, or, over mountain tracks, mules, hill camels, and in special cases perhaps coolies. By this means we should avoid using mules over sandy soil, and plains camels over steep, rocky pathways, and yet not interfere with the continuous stream of supplies going up to the front, which would also be materially lessened in bulk, as railway trucks do not require feeding. Take for example a section of a country, the direction of advance through which would be as given in sketch marked C. The existing system of railway of the country would be produced to the furthest possible limit, then plains camels would be used for section II, section III would be the portable railway, section IV hill bred camels, section V railway, section VI mules, and perhaps section VII coolies. The section of country given is of course an imaginary one, but not impossible, and gives an idea of the division of labour which I wish to convey.

I am well aware that there are drawbacks to a small portable railway, whether worked by steam or animals, and that those best qualified to speak on this subject (Mr. J. R. Bell, C.E. Engineer-in-Chief, Frontier Railways, among them) are averse to any system of railway on a gauge smaller than the metre gauge; yet I am not thoroughly convinced on this point. Perhaps the history of the Decauville tramway to Geok Tepe in 1880, which has since given way to the Trans-Caspian Railway (gauge 5·63), is an argument in its favour.* The general idea among the railway world, or rather those who have studied the matter, is that the line in the event of war in Afghanistan should be, (a) continuous, (b) worked by steam, (c) and of no gauge smaller than the metre; all three of which conditions are said to be possible. As regards the latter point, curves and width of truck are the only points that make for less than the standard gauge, for the cost of bringing up engines and waggons of even the metre gauge to Peshawar is most serious. In a great emergency we could do it by stripping lines in India of part of their stock, but of course for any smaller gauge, as for example the portable two-foot railway above alluded to, we should have to buy and keep ready on hand engines and waggons: this would be, nevertheless I think, money well invested.

What is also required to carry out any sort of railway is a reserve of engineers, some with railway skill, others in touch with the labouring masses on both sides of our frontier. The labouring class on our side of the frontier is a vanishing quantity. Rain-gambling in the form of sowing a wheat crop, which may come to nothing or may be a little *eldorado*, has destroyed the labouring class, and in our next big war we shall have to pay dear for fol-

* Vide "Trans-Caspian Railway" Compiled for International Railway Bulletin by L. Weissenbruch. Translated by J. R. Bell, Esquire, C. E. Engineer-in-Chief, Frontier Railways, India. 1892.

lowers other than cut-throats. All this makes for railway idea of some sort in our next operations on a large scale across the frontier.

That "victory depends on the legs of the army" is an old saying, and open to argument, but that success in mountain warfare is enormously affected by the legs of the army is undoubtedly true. To ensure that we shall not in the hour of need fall short in this respect, every endeavour should be made in peacetime to bring our fighting machine up to the standard of locomotion. This can only be done by route marching, and although the necessity is fully appreciated in some commands, it is not sufficiently carried out in others; and neglect of this precaution is deliberately throwing away a trump card that we shall have sore need of, when our next great war in the mountains comes on the *tapis*. As a general rule now-a-days, a commanding officer's chief idea is to avoid a large percentage of third-class shots, and to this end he strives, forgetting that marksmen with third-class legs are but poor soldiers.

The next thing to consider is how your machine is to be shod for hill campaigns. Grass shoes, *crampons*, *chaplis*, and *nundah* socks have all their advantages at different times, but the soldier's wardrobe must be limited to one universal pattern; and for rocky, grassy, snowy, steep or level walking, whether in hail, rain or sunshine, the ammunition boot with the sole well covered with nails is, I think, taken all round, the best for all arms, British and Native. For those officers or men who are frequently mounted, I would advise only the heel and tip of toe to be hobnailed, thus allowing a flat sole for the stirrup iron. Putties as a universal pattern are preferable to gaiters or field boots; the latter are bad for hill climbing and wet weather, the former are apt to fail in the way of buttons or buckles, are not so easily dried, and allow free ingress to leeches; putties, moreover, make a very good belly band for chilly mortals after a hard day.

We are told that "the success of military operations depends in a great measure upon the compact and well regulated order of march;"* it also depends on the *nature* of the route. In the early part of this paper I alluded to the faulty information in 1863 regarding the Sukhawai Pass, leading to Chamla, which was reported to be "easy in the extreme," but turned out to be a mere track covered with rock, thorny bushes, and cut up by ravines, thus delaying the advance, which could only be made in single file. Take again a case in point from the campaign of 1799 in Switzerland. There, instead of moving against the French in Switzerland by the Simplon or St. Bernard route, Suwarow

* Infantry drill, 1889. para 1, part V, Section 2.

chose that by St. Gothard, as it was the shortest, although he knew it had never been traversed by troops before; with the result that on the 27th and 28th September, so great were the natural obstacles to the advance, it was a question whether he would not have to retrace his steps and try to force the entry by some other pass. He, however, arrived at Schwyz on the 28th with the head of the column, but "the remainder, scattered here and there among the rocks, struggled till nightfall on the 29th against obstacles that nature in her savage mood presented to the advance of the troops. The beasts of burden and Cossacks' horses wore out their shoes on the sharp points of granite, and were unable to follow. A great number fell down the precipices. Le Courbe appeared on the scene and made confusion doubly confounded."*

Again in Sikkim, on 20th March 1888, during the advance on Fort Lingtu, the difficulties in that small fight chiefly lay in the steep and broken nature of the road; the snow too, which near Garnei was only 2 or 3 inches, increased in depth as the force proceeded, and the final charge was made over snow from 18 inches to 2 feet deep.

Major Clibborn's disastrous march to the relief of Kahan in 1840 is also an example of how lack of water and excess of heat may upset all arrangements of a march. It will therefore be evident that in marches, whether or no battle is imminent, and this in hill warfare is often impossible to tell with certainty, a very great deal depends on the route or routes selected and their nature.

The object and requirements in all marches are to bring troops to the right place at the right time in the most efficient condition; to ensure this therefore, the routes, or route, if only one is possible, must be well chosen, and to do this the Intelligence Branch of the force must be up to its work. When the force is large, of course, when possible, it is best to march by different routes, provided concentration at the point and at the time required can be ensured; when there is any uncertainty of this, it is better to trust to one route rather than run the risk of meeting with a fate similar to that which overtook Alvinzi in 1797.

In mountain warfare, more often than not, when invading an enemy's country, the force has to make its road before the troops can advance, and this necessitates time. The order of march will probably be as follows:—

Advanced guard (infantry with signallers).

Covering party to pioneers or sappers at work on road.

Pioneers and sappers making road (and moving on as it becomes passable).

* Swiss narrative of the campaign of 1799, translated by Major-General Shadwell. H. S. King & Co., 1875.

Mountain battery or batteries and escort.

Infantry.

Field Hospitals.

Staff baggage, regimental baggage, and supplies, with baggage guard.

Rear guard.

Reserve ammunition, pakhals, dandies, entrenching tools, and hospital panniers, must accompany each regiment or battery, following immediately in its rear, as in a column organised for hill warfare it is impossible to tell when a fight may occur, and it is essential to have each unit complete in itself, as in a narrow pathway, or through thick jungle, it is impossible to get up ammunition or dandies from the rear of the column without great loss of time. Halts should be regular and frequent in steep country.

In countries where forests or jungles are thick, and where cliff and khuds are precipitous, as for example parts of Lushai, Burmah, Hunza, and Allai, where roads have to be made *en route*, the rate of progress must necessarily be very slow, often not more than $\frac{1}{2}$ mile per hour, owing to the immense labour of bamboo-cutting, tree-felling, digging, and blasting. Troops on these occasions should be halted, so as not to interfere with the working parties, who as soon as the track is fit for passage will advance with the main body (the road being improved by working parties behind).

Hill tracks are as a rule made 6 feet wide, and allowing 600 yards for a mountain battery, *i.e.* including all ordnance mules, bare backs, and ponies, and 1,000 yards for an infantry battalion with machine gun detachment on line of march, and without baggage, an idea can be formed of the immense amount of labour required to pass a brigade along a narrow hill path, and the enormous length of the column of route.

As regards the difference of time taken in the ascent and descent of hills, it has been found by practice to be practically *nil*: infantry will go a bit faster down a mountain slope than up it, whereas the mules generally make better time when ascending.

With marches over snow we have not had very much experience; they should be timed so as to start over snow passes at break of dawn, and cross the snow while it is hard 'ere the sun thaws it. When moving up a hill side covered with snow, there being no pathway or means of knowing how the ground lies, a track should be taken along the ridge of a spur or along the main watershed to avoid drifts. In the reconnaissance to the Machai Peak early in April '91, the last 3 miles of the ascent were over snow, and for the last 1,000 feet there was nothing to be seen

but the smooth coat of virgin snow. By following the watershed the small party reached the summit with but few adventures, though had they been attacked when up to their waists in snow on the ascent or descent of the Peak instead of lower down where the snow was but a few inches, the predicament would have been awkward to say the least of it. Besides the dangers of drifts, there are those of snow storms and consequent darkness, and, if the march was begun late, the risk of being benighted in a whirling storm on the passes.

When returning down a hill side covered with snow, and provided the country is clear, a mild form of tobogganning is restful, invigorating, and cheering to both officers and men; and I have seen the practice indulged in with some success by all ranks, G. O. C. downwards, thereby saving the constant jar to one's knees when treading wearily down hill through the snow, and at the same time obtaining a speed of locomotion unobtainable elsewhere.

Night marches in the mountains, especially in winter, are dangerous and difficult. It is often as much as the advanced guard can do, even with the assistance of guides, to find their way at all through black forests and over rocky and precipitous ground; and the accidents from men and mules falling down khuds are increased a hundredfold, added to which there is always in the hills, acting against wild fanatical tribes, the danger of a panic, especially with young troops early in a campaign 'ere they have become properly "*aguerri*."

There are times, however, when owing to the heat of the day, the extremely strong position of the enemy, for the purpose of surprises or other good reasons, it is essential that a start should be made over night, as for example the march of Major Vaughan's force and surprise of Naringi on night of 20th July 1857, and Major-General Sir S. Cotton's expedition against the Khuda Kheyls at Chinglai on 26th and Mangalthana on 28th April 1858. On these occasions more than ordinary safeguards against dangers from the elements, the nature of the country, and the foe should be taken. No route should be used by night, concerning which little or nothing is known, as even in daytime to attempt unknown routes has been shown to be a hazardous undertaking. The proposed route should be reconnoitred as far as possible beforehand; a guide, native of the country, should, when possible, march with the advanced guard, who will, if necessary, rope him to two soldiers to avoid desertion or betrayal. Guides who perform this duty satisfactorily should be well rewarded in hard cash *on the spot*.

Where the pathway lies circuitously through forest or jungle, the conversion of a file of the advanced guard into "hares" to lay a "paper chase" course is not a bad plan, and would be a good way of disposing of many superfluous commissariat forms !

Sir John Moore laid a "straw chase" in the night march from Lugo in 1809, but a storm coming up played havoc with the line, and the guides lost the way in consequence.

Lanterns, matches, torches, and a good supply of rope should be ready at hand ; the movement of the force should be made with as little noise as possible, the troops when practicable being moved without transport animals. The mountain batteries will in case of night marches follow the infantry required for the attack. Dogs and stallions should on no account accompany the force.

The advanced guard should march with fixed bayonets, ammunition ready in pocket or bandoleer, but *not* loaded ; and, if attacked *en route*, must trust chiefly to cold steel, a few shots being fired, when necessary, to warn the main body. Should the enemy be met in large numbers, a defensive halt should be made, till it is sufficiently light for the commander to make his dispositions. The distances between rear guard, flank guards (if any), advanced guard, and main body, must be considerably reduced ; and the rear guard must not move on until every man or animal (if any) of the force has preceded it.

Our infantry drill (1889), though it deals with advanced and rear guards, is, practically speaking, except as regards a few general maxims, of little use as a guide for mountain warfare in India. The various local circumstances alone must decide in what manner these duties are to be carried out.

When advancing over open country in the mountains (take for example the route from Chirmang *viâ* Maidan to Mzari Kandow (Nandihar), the normal dispositions, with modifications as to distances and flanking parties, answer well enough, as the country, though steep in parts, is tolerably bare and open, and the advanced guard, by following the ridge and round the slopes here and there, gets a fair view, and can signal back to the main body. Take, however, the road from Mzari Kandow to Pokul (*viâ* Chela, Kaga Obi, and Gali : Allai), and the state of affairs is very different. Here, owing to the steep khuds on either side and the dense forests, the advanced guard can see but little in front of them, and nothing beyond a few yards (except in open spaces) on either side. Any idea of advancing with skirmishers over a broad front is impossible ; there is but one available track, and that but a poor one, requiring many repairs ere mules can be brought along it. Consequently, when moving over this country in November 1888,

the advanced guard consisted of one company headed by feelers (3 files, two men watching the front, and 2 men watching each flank); following them at a distance of about 20 or 30 yards came 12 files, and the rest of the company about 40 yards behind. Take another case, that of the march of our troops through the impenetrable forests between Demagri and Lungleh (Lushai) in the spring of '89. Here the advanced guard literally had to cut their way along with kukris, making a track as best they could, then halting and placing double sentries as much in a covering line as possible, whilst the main body continued the arduous labour of cutting and removing the bamboos from the track. Either in this case or when working along the Himalayas in dense forests, to attempt any such thing as flankers *moving along with the force* is dangerous, unsatisfactory, and in many cases impossible. The men find it as much as they can do to look to their footing, and are useless as watchers for the enemy, who, concealed in dense undergrowth, behind trees or rocks, are able to pick off our soldiers as they struggle along their difficult path.

There is one suggestion that I would make with regard to the protection of the flanks, which on more than one occasion on service has struck me as very necessary. Unless some means are taken to prevent constant firing from the forest on either side, loss in men and animals must occur, and it is a dispiriting way of losing men, as they feel they are more or less helpless, it being impossible to get at the foe and often as impossible to see him. Flankers on the move are out of the question; they can neither look about them, nor properly use their rifles. I would suggest *stationary* flankers to be dropped from the head of the column, say 2 files every 20 to 100 yards according to the nature of the country. These men could conceal themselves behind rocks or trees, and keeping a sharp look-out and remaining quiet, would probably be able to get many shots at single men or parties creeping up to harass the advance. In this way we should treat the foe to his own tactics, and if constantly followed, he would be more chary about attacks on columns of route.

As the rear guard passed the files thus dropped, they would follow on with them, the rear guard gradually joining the main body, and becoming eventually the head of the column (vide sketch marked D). In this manner there would always be a line of defence on either flank, and while in no way over fatiguing the men by moving them over precipitous ground, it would nullify to great extent the demoralising effect of the hidden fire from the enemy on either side.

It will be observed that in discussing this matter I have been only considering the advance of small parties, but the rule equally applies to brigades or divisions, and the longer the column of route

the more necessary the precautions. In brigades of course each unit would find its own flankers.

The dispositions necessary for attacking or defending a defile are, one may say, the first steps towards successful mountain warfare. Hardly ever have our troops passed beyond our frontiers without having to commence or end operations by fighting their way through some defile on the borders of tribe-land held by the mountaineers.

Roughly speaking, to successfully push through a defile held by the enemy, the flanks must be turned. This practically entails the splitting up of the force into three or more parties. The nature and practicability of the ground on either flank probably confine the problem to one of space, time, strength of enemy, and number of troops at the disposal of the commander ; and as time, especially in mountain warfare, is an important factor, it is accepted as a general principle that, "if the movement of an attacking force to turn a defile affords the enemy an opportunity of acting advantageously against it while so employed, the existence of the turning point ceases to be a danger to the defenders."* Should, however, it be possible, given a sufficient force, time, and manœuvring country, the first thing to do is undoubtedly to clear the heights of a pass, flanks of a bridge or ford, drive off the enemy, and push one's force through as rapidly as possible, taking up a strong position on debouching.

Defiles differ materially as to their adaptability and object for defence ; there are cases when the best position would be on the side nearest the foe ; as a rule this is generally adopted for rear guard actions, to enable the force to pass over or through the defile, and is generally, if successfully accomplished, succeeded by a stronger position from the rear of the defile, *i.e.*, farthest from the enemy. As a case in point, General Crauford's defence of the passage of the Coa in July 1810† is a good example of what can be done with a small force well handled, against overpowering numbers of the enemy, provided the ground adapts itself to the defence.

There are cases when, owing to the strong positions obtainable inside a defile, the defence might be taken up there in preference to or in addition to a defence at either end. The Austrian army took up such a position with complete success in the defile of Pol Kost in 1866, when, owing to the failure of two determined attacks, the Prussians had to retire out of range and wait until the position was abandoned. Not infrequently has it occurred in our mountain wars in India, that by tactics similar to these, "a

* Clery's Minor Tactics, Chapter XVI.

† History of the war in the Peninsula, by Lieut.-General Sir W. Napier, K. C. B.

small force employed in well chosen ground has been able to hamper the movements of a superior body and gain time for other operations. The different applications of this detaining power of small bodies are so numerous, that hardly any problems either of strategy or tactics are intelligible, unless its nature is understood ; the essence lies in the smaller body not allowing itself to become so engaged as to have its organic unity destroyed by defeat.*

However studiously we may wade through the "Infantry Drill" and standard works on the art of war, we shall not find anywhere "forms of attack" laid down for mountain warfare. This is only natural when we come to think of the thousand and one different circumstances under which our battles are fought in the hills. Prince Kraft, in picturing an attack on a village over open ground, premises his remarks by saying, "It is, however, always somewhat misleading to attempt to lay down any detailed instruction for such an enterprise, since in special cases some modification must invariably be made, while in exceptional instances all such rules may be altogether falsified.†

If this holds good in such an ordinary occurrence as that alluded to, how much more so a hundred times may it be said of attacks carried out in mountain warfare. I do not mean to assert that there should be no "ideas" promulgated for guidance when fighting in a mountainous country ; on the contrary, I consider it extremely desirable that a few important precepts gathered from the vast experience gained on our frontiers, merged with general maxims, should be issued "by authority", and embodied in part V of the new drill book ; but no particular "forms of attack" for use against mountain tribes can possibly be adhered to, as in this case we should require at least a hundred forms, if we in any way wished to embody all the different conditions under which successful operations in the mountains can be carried out.

While alluding to this subject, one's attention is naturally drawn to General Kinloch's "Forms of attack"‡ lately issued, in which there are two examples of possible forms that might with advantage be used in hill warfare, provided the circumstances and nature of the ground were as depicted. Example III of General Kinloch's book, however, appears improbable. The fighting instincts and knowledge of mountain warfare, inherent in mountain tribes, lead one to the conclusion that on arrival at the village marked "enemy" in the sketch, we should find it occupied by three old men, a Hindu bunnia, and a few dogs ; the *Penates* of the

* "War", by Colonel F. Maurice, page 38. Macmillan and Co., 1891.

† "Letters on Infantry", by Prince Kraft zu Hohenlohe Ingelfingen, letter XI. Ed. Stanford and Co., 1889.

‡ "Forms of attack", by Brigadier-General A. A. A. Kinloch. Pioneer Press Allahabad, November 1892.

community being as usual stowed away in the *ziarat* (graveyard) at least, I doubt the existence of mountain tribes, who would so completely lay themselves out to accommodate an "attack formation" as those marked "enemy" in the sketch.

In discussions, however, that have appeared since the publication of these "forms", I do not think that the author's intentions have been sufficiently understood. He particularly lays stress on the fact that they are but meant to be guides, and "should not be slavishly followed on service". It stands to reason that time, place, and opportunity alone can determine on what particular lines it would be best to attack an enemy in position or positions on the mountains.

The question of forms of attack of any sort, whether for fighting in the plains, in jungle, or in the hills, has become a much mooted point. I think it is generally admitted, however, by those who have studied the matter, that something more than the mere essay on "Battle formations", given in Part V of the new provisional drill book, 1892, is required, if only for purposes of uniformity of drill and training; and considering all things, I am of opinion that what would satisfactorily meet the case and avoid a multitude of "forms of attack," would be two recognised forms of manœuvre, *viz.* (a) close order, and (b) extended order. Each of these forms should contain all the evolutions that can be required in the field, and by combining the two in a force of any proportions, the officer in command would be able to form his order of attack to meet the particular circumstances to be dealt with. The requirements of a precise drill for the barrack square would be met, while the commander would have free latitude in arranging his order of attack; and such being the only recognised formations for troops, capable, of course, of manifold modifications whether in hills or plains, the endeavours of officers commanding to start "Turks"* of their own would be nullified, neither would they be able to convert the authorized formations into "Modified Turks", as would I think still be possible were any formations for particular circumstances of war put down in black and white, with plans and sketches complete, and issued "by command of H. R. H." as "forms of attack."

Other most important factors in considering attack formations in mountain warfare are class of enemy against whom the attack is to be formed, and the thousand and one variations as to natural features, climate, and vegetation of the theatre of war. Whether we are engaged in mountain warfare against Russians armed with magazine rifles and modern guns, Afghans, Chinese or Russians with breechloaders, Afridis or Kafirs with jezails

* Prince Kraft's Letters on Infantry, Letter IX.

and a percentage of stolen Martinis and Sniders, Thibetans or Shendus with their blunderbusses, jingals, spears, and arrows ; whether we operate over valleys, marshes, snow-capped hills, rugged crags, jungles, deserts, or pine-clad mountains, each has to be considered separately in elaborating plans of campaigns, and to attempt any such idea as the colliquefaction of such heterogeneous factors into any recognised "forms of attack," with no matter how many kaleidoscopic variations, would be but to court certain chaos, and, by the adoption of a multitude of methods, would conduce to the lapsing of our whole system of drill and instruction into an utterly unsystematical series of fallacious formations.

From the above it will be gathered, at least I hope so, that what I would suggest as regards the offensive in mountain warfare is that there should be no stereotyped forms or plans of attack, but that troops should be trained to fight (a) in close order and (b) in extended order ; that the principles of battle formations, as given in the new drill book, should be adhered to *with the addition* of special notes and precepts, framed from past experience, on the subject of jungle, desert, and mountain warfare.

"*Longum est iter per precepta, breve et efficax per exempla.*"
So I will take two or three examples of attack from our past mountain wars, and draw from them the notes and precepts above alluded to.

To begin with, I will take the capture of Maloun and Soorujghurh (Nipal), 14th and 15th April 1815, by General Ochterlony. Having reduced the garrisons of Ramgurh, Taragurh, Chamba, and Torjoree, the General made his preparations for his combined movement against Umar Singh's strongholds on the range between Maloun and Soorujghurh (vide sketch E). The position was undoubtedly a strong one, the two forts being well defended by stone parapets and walls, and all but two of the intervening peaks stockaded and occupied. The advance up to any of these points was open to direct and flanking fire of the enemy.

General Ochterlony's plan was to effect the capture of the Ryla and Deothul peaks, the only two unstockaded points, and thus divide the Goorkha forces. To this end he despatched four columns ; three from Pulta, Joynuggar, and the Head-Quarters Camp, on to Ryla, which was successfully occupied at night, and the 4th (one native battalion) to assault and occupy Deothul. This column, after hard fighting, obtained a footing on Deothul, owing to a great extent to the attention of the Goorkhas having been drawn off by an attack on their left flank at Maloun. Deothul was then put in a state of defence as far as time would admit, with hastily improvised works, and thus the first phase of the plan of attack was successfully completed.

The Goorkha General at this stage of affairs, fully appreciating the absolute necessity of dislodging the British force from Deothul, which position not only threatened his rear but divided his force on the ridge, ordered an attack to take place under Bhugtee Thapa ; and this was carried out on the morning of 16th April with furious intrepidity, but failed to dislodge the British and collapsed, having sustained a loss of 500 men, among whom was Bhagtee Thapa himself. On this the Goorkhas abandoned Soorujhghurh, and concentrated round Maloun, where they held out until a battery was moved up to Deothul and was about to open fire on the fort ; then Umar Singh, finding his retreat threatened, his army in danger, his chief deserting him, and, owing to the loss of Deothul, his position untenable, capitulated, and signed the agreement which brought to a close the Nipal war of 1815.

"The dispositions for operations exhibited wonderful skill, and the precision with which the movements of the different detachments were calculated, reflects the greatest credit on those who collected the intelligence and furnished materials on which the plan was designed."*

The main points that call for notice in these operations are the rapidity with which General Ochterlony pushed his successes after the capture of the smaller forts, giving the enemy no time to consider what his movements were likely to be ; the excellent arrangements by which the several columns operated from different bases together ; and the cutting in two of the forces of the enemy, thereby threatening his line of retreat, by the occupation of these two important posts, which in all probability would not have been obtained but for the well planned and thoroughly carried out feint on the enemy's left flank. The reliable intelligence received, and the advantages gained by *at once* improving the position won at Deothul by sungars and entrenchments, are also worthy of note.

As another example of a well planned attack against what was supposed to be an impregnable position, General Ty ler's attack on Zawo in the Zaimusht country on 13th and 14th December 1879 is a good example of the difficulties of mountain warfare and the means of overcoming them. As my space is limited I will refer the reader to the official account of this expedition, and content myself by remarking that the chief tactical lessons to be learnt from the operations are the necessity when dealing with Orientals of keeping them constantly on the move, never allowing them to retain possession of a single strong position, turning him out of it by a flank attack and guns, if necessary, and pursuing him as rapidly as possible. They also point to the absolute necessity of crowning the heights *before* entering

* Official Report on Nipal, 1884.

a gorge, but at the same time show that where it is necessary to exhibit a bold front, or when any check would give increasing advantage to and encourage the enemy, it is best to push on, covering the flanks by long range fire, rather than lose a chance of dealing a decisive blow. It will be noted that the frontal attack of the 85th Regiment on the enemy's second position failed more than once, and it was not until he found himself attacked on his right flank as well, that his Pathan dread of having his retreat cut off got the better of him.

On both the above occasions it was possible for the commanders to strike an effective blow on the enemy's flank, and threaten his rear. In the former case his forces were cut in two by the penetration of his line of defence; in the latter his position was doubled up by the attack of the 85th Regiment and 29th Punjab Infantry on his left front and right flank.

As an example, however, of an attack when movement to a flank is not feasible, and when owing to the densely wooded and precipitous nature of the country, a direct attack on a very small front has to be made, General Channer's assault of the Chela Crag (Allai) on November 1st 1888 is well worthy of note. The country beyond Mzari-Kandow was, comparatively speaking, quite unknown, save that the track into Allai over the Ghorapher (W. point of Crag) was supposed to be the shortest route, though steep. The advance lay along the ridge running S. S. W. from the Crag (vide sketch marked F), the slopes on the east being comparatively open, and unoccupied by the enemy, while those to the west were steep, densely wooded, and occupied by small parties of Asula Khan's men armed with rifles and matchlocks.

The advance was, consequently, very slow, and was made on the same principles as those noted under the head "Advanced Guards," feelers being put out in front, and the flanks protected as far as circumstances would permit, the track being made practicable for battery mules as the force advanced.

On arriving near the foot of the crag it was discovered that the ground to the west of the position was precipitous and thickly covered with pine and ilex; the whole south face of the Chela Ridge was rocky and precipitous, the actual spur leading up to Ghorapher was "precipitous, and consists of huge projecting rocks, the gradient being $\frac{1}{2}$ and $\frac{1}{4}$ in parts."* On the summit, and behind rocks and trees down the spur the enemy had taken up positions, "that, held even by a small, badly armed force, appeared almost impregnable."† This then was the unforeseen state of affairs that presented itself to the commander at noon on that Nov-

* Official report on route.

† Remarks by Major-General McQueen at Abbotabad at the close of the expedition.

ember day. Two courses lay open to him, (a) to retire from this unenviable position and arrange for an assault from the eastern spur *viâ* Batgraon and Kohani, a movement necessitating a day and a half march by the Nandihar valley; or (b), putting on a bold front, to assault the enemy in his fastness on a small front up the precipitous cliff, open as it was to fire from above and the danger of rocks being hurled down on the force as the men climbed up the face of the stronghold. Had we been dealing with a civilized enemy, armed with modern firearms, the latter choice would undoubtedly have been madness; but General Channer, knowing full well the character of the tribes with whom he had to deal, and foreseeing the bad effect that a retirement of any sort, in the face of the ever increasing numbers of the enemy, would produce, determined at all costs and at once to make a bold bid for the summit. The screw guns had in the meantime been brought up to an open space on the track near Bagsir, whence at about 1,500 yards they opened a brisk fire on the Crag, driving the enemy off the lower points to behind the rocks nearer the summit. The order was at once given for an advance, the Northumberland Fusiliers to the right, the Khyber Rifles to the left, of the spur. This was responded to by increased fire, hurling of rocks, yells, and discordant sounds of *surnais* from above. The troops advanced up the spur with a cheer, literally climbing like cats from rock to rock, and helping each other over precipitous parts, in spite of the shower of rocks from above. Meanwhile as many men as could be formed up on the ridge below opened with volleys on the summit above their comrades' heads, and the guns fired salvoes of shrapnel at the yelling hordes above. The position, formerly the scene of many bloody tribal fights, was considered by the Allaiwals quite impregnable, and I am convinced the moral effect of such a dashing attack had more to do with the precipitate flight of the enemy as our men neared the summit than the fire from below, as it was quite impossible for the climbers themselves to use their rifles. Our men reached the summit in twos and threes with fixed bayonets, greeted by a ringing cheer from their comrades below, only to find the enemy beating a precipitate flight away among the pines in the direction of Kaga Obi. Our loss on the Crag that day was but small, but I have no hesitation in saying that had the *apparently* more cautious tactics been adopted, we should not have retired from the foot of the Chela Crag as far as our former bivouac without considerable loss from parties of the enemy, who, emboldened by our seeming defeat, would have harassed the troops from all sides as they retired.

These are but three examples out of the thousands of attacks in mountain warfare, that one could bring to bear on this subject;

but there is no lack of further information to those of an enquiring turn of mind, for episodes innumerable, enacted in Burmah, Afghanistan, Lushai, Sikkin, Bhutan, Hunza, and on our North-West Frontier, flit across one's mind, but must for want of space be left undiscussed.

I will now endeavour from these past experiences of our rule in India to summarise the special notes and precepts I alluded to when commencing this section of my paper.

(1). In the first place when dealing with Asiatics, and I think we might almost class the Russian forces in Asia among these, it is ten to one in our favour from a moral point of view alone, if we can act on the offensive, paralyze the resources of the enemy at the start, and follow up our successes *at once*, until he is harried and harried, and stands feebly at bay at the end of his tether. In mountain warfare more than any other the truth of Napoleon's remark, "*La morale est pour les trois quarts, le reste est peu de chose*", is self evident. A defensive resistance gives courage to the enemy and those independent forces around him who are wavering in the scale. An active and pushing policy, with "short, sharp, and decisive" as our motto, strikes fear and demoralisation into the foe, and converts the wavering tribes around into hordes of wolves upon his track instead of allies hoping to participate in his success. Ambeyla surely points to the necessity of a pushing policy, and when, if ever, the Cossack appears among the wild tribes of Central Asia *enroute* to what he vainly hopes may be the conquest of India, let us consider whether we would have the vast hordes of wolves from Central Asia and Hindustan howling around our defensive posts, or picking up scraps from the trail of the discomfited Muscovite.

(2). In mountain warfare, although the tactical objectives may be ranges of hills and high peaks, the strategical objectives of the campaign, at which we must aim, are the big villages and towns in the valleys ; and it is only by making our force felt at these centres, and not by waging guerilla and intermittent war among the hamlets and pine-clad hills, that we can ever bring the enemy properly to terms. Napoleon in his criticisms on the way the Engadine campaign of 1799 was planned in the Head-Quarters *bureaux* at Paris by men ignorant of the art of mountain war save in theory, very tersely remarked, "Mountains depend on the plains, and have no more influence in commanding the plains than the position they afford guns, * * * your enemy has large towns, fertile provinces, a capital, to protect ; make straight for these ; the art of war is simple and practical, and requires good sense not ideology." These words are very applicable a century later to "mountain warfare as applied to India."

* *Commentaires de Napoléon*, Volume iii, pages 464-465.

(3). In attacking a strong position in the hills, it is undoubtedly a tactical error to allow one's main body to be split up over various passes in crossing the hills to attack ; they become separated by time and distance, and give great opportunities to the enemy. The best way to pass a mountain range defended by the enemy is to make feints at many points, but to pass one's main body over at one place, or in columns near enough to permit of easy and timely co-operation.*

(4). "Asiatics are always nervous about having their flanks turned or their line of retreat intercepted."† This is a truism which should be thoroughly appreciated and acted on by all commanders.

(5). When advancing to attack up steep hill sides or through dense jungle, the move must of necessity be slow, to allow the support to keep up and to prevent the men being too fatigued when the assault takes place. Advances up mountains must be along the ridges and spurs and not up the water courses.

(6). Flanking parties should always, when possible, be posted to guard against flank attacks by the enemy, ensure the safety of the main advance, and assist in the attack by bringing a heavy fire to bear on the enemy and attract his attention from the front attack, which probably, moving over stiff mountainous country, can use their arms but little. For this purpose machine guns are invaluable, and nowhere have I found this point so admirably elaborated as in the Second Prize Essay of 1888.‡ When advancing on an enemy's position on a ridge or spur, great assistance can be given at long ranges by guns advancing up the neighbouring spurs on either side. The screw guns from Barcha on 4th October 1888 did good service by dropping shells into the enemy's sungar on Mana ka Dana, up which spur the 1st Column advanced.

(7). If possible and the country admits of it, it is of advantage to be in position to assault at daybreak, as the enemy are then unaware of the "decisive point" chosen.

(8). The distances, when fighting in dense jungle or woods like Burmah, Lushai, and the west slopes of the Black Mountain, must entirely depend on circumstances, but the several parties should be well within touch. It gives the "screen" or "feelers" confidence, and prevents the chance of a reverse and the head of the column being driven in by an ambuscade,

(9). The advanced "screen" or "feelers" should never retire to fight with the supports or main body ; the latter should, no matter how bad the ground, move up to hold that already occupied, if necessary pushing on to a better position *in front*.

* Vide "Operations of War" by Sir E. Hamley, pages 231-2.

† Brigadier-General A. A. A. Kinloch, in his "Forms of Attack."

‡ Silver Medal Prize Essay, by Lieutenant-Colonel Geo. Young, 24 P. I, Journal of U S. I. of India, September 1888.

(10). Cover should of course be taken advantage of in the attack, but I think, during the heat of action, most officers will admit that it is more difficult to get the men out of cover than into it. The question of "cover," artificial or natural, has been much discussed, the subject having come so prominently to notice in the Russo-Turkish war of '77; but in spite of the tactical lessons drawn from the spade in that campaign, I am strongly of opinion that in mountain warfare we should not lay too much stress on the point. To "take every advantage of cover" is, of course, quite proper, but Asiatics as a rule do the same, and if both sides acted like the Shan states of old, purely on the defensive, we should never get on and "forward" must be our watchword. When cover is available, and troops are moving under fire (not on a parade with blank !), men take advantage of it fast enough. The object, however, must always be to drive the enemy from *his* cover, and this can not be accomplished by sitting behind rocks and trees or hastily improvised shelter-trenches.

The use of shelter trenches *when* the position is gained cannot be over-rated, and I am all with Colonel Young, when he suggests that tools should be company equipment and kept as close to the men as possible. This has, in fact, of late years been recognised and carried out in our frontier wars.

(11). An attack once commenced should never, unless absolutely necessary, be discontinued, no matter how imposing the sunnar, stockade, or position may appear at close quarters. Once committed, the attack must be followed up, for the moral effect of the loss of a few men in retirement would be infinitely disastrous compared with the loss of perhaps four times' the number in a successful assault. Some brave man will most assuredly find his way into the stronghold, and where one leads many will follow.

In operations on a larger scale than we are usually accustomed to on our frontiers, say for instance war in Afghanistan against an European enemy armed with modern firearms, it may be at times necessary to fight a defensive battle, waiting for the enemy to attack us on a selected line of hills, previous to falling on him after he has been repulsed. The nicest tactical observations are necessary in the selection of such a site, which will also be probably affected by reasons political as well as strategical and tactical, and every endeavour will have to be made to ensure each gun and rifle being used to its best advantage. The great difficulty in occupying a position in the hills is, without doubt, the enormous number of men required, if the entire position is to be amply defended. This was exemplified very clearly during the Attock manœuvres of 1890, when with the available force it

was found impossible to hold with any certainty even the left section of the defence. In such cases then, it is "more consonant with prudence to hold the principal passes, those which lie most directly in the line of operation, and have the best communications to the rear."*

It will be generally admitted that the main infantry defence, especially with the assistance given by entrenchments, should be thrown well forward, in order to get within effective rifle fire of the enemy's guns as they come into position over the hills, and to prevent the attacking infantry bringing fire to bear on the guns of the defence before the attacking force is actually committed to the assault. Therefore it is better to push a bit too forward and ensure good practice, rather than trust to the effect of long range volleys. Every spur or crest to the front, along or over which the attacking force may move, should be accurately ranged from all parts of the defence, and arrangements made for concentrating fire on these spots. For night firing rests, tape, lines, search lights, and star shells can be used with advantage; what would be preferable to the latter, however, would be parachute light balls whereby the light would hover over the spot longer than it does with star shells; pitfalls, mines, and every conceivable kind of obstacle should be arranged within easy effective fire (Lee-Metford fixed sight) of the defence, and lastly positions to the rear and front should be settled on before the attack commences.

The proper defence of camps and bivouacs in our mountain wars is of the very greatest importance; every halting place (though even for a night) should be put in a state of defence, as it is impossible to tell when one may be attacked. Troops themselves fully recognize the value of the roughest description of fire-cover, as it ensures as a rule a night's rest. Care should always be taken in selecting sites for bivouacs that they are not, unless inevitable, commanded by any neighbouring hills within range of the enemy's fire; a position selected on high ground, so that the enemy's shots from below go over the camp or into the defence works, is a great comfort at night. The mere fact of commanding positions outside the camp entails more piquets and detached posts, separated from the main body, may be, by cliffs, ravines, or torrents, which, in the case of night attacks, is an immense disadvantage.

The ordinary methods of putting positions in defence adopted in mountain warfare in the east consist of stockades, earthworks, blockhouses, and sungars, associated and in conjunction with the natural defensive properties of the ground. At Lungleh Post in 1889 (Vide sketch marked G) the stockade was 11 feet high with a V-shaped ditch 13' wide and 8' deep, in front of which the ground

* "Operations of war," Lieutenant-General Sir E. Hamley. Chapter III

was well "*panjied*" (*i.e.*, studded with bamboo spikes). It consisted of vertical logs let into the ground three feet and tied back with telegraph wire whenever there was any weight of earth behind it; behind the vertical logs were horizontal layers of small timber. At various points raised platforms for sentries were placed. Plan marked H gives a rough idea of the sort of stockaded post required for a detachment of 100 rank and file native troops.

Stockades, bamboo, bayonet pattern (vide sketch J), are largely used in Burmah and other countries where timber is scarce and bamboos plentiful. They form a very severe obstacle, and with earthwork inside give excellent cover.

Sungars (vide sketch K) are the normal defensive works of hill tribes on the N. W. Frontier; they make very good cover, and with the addition of ditches and obstacles outside are suitable defence for bivouacs and piquets. Sungars and block-houses of stone and timber have been largely used by us on the N. W. Frontier.

Villages are capable of being turned into posts of defence, the tops of the houses giving a good commanding position, and very suitable for machine guns.

Sketch marked L gives a rough idea of defences thrown up at night round a bivouac, similar to those used at Chittalut on 5th October 1888, which were improved into more permanent defences the next day (sketch M).

Where it is possible in *small* hill wars, it is preferable to do

Outposts. away with out-lying piquets altogether, and to have simply the limits of the camp well fortified with earthworks, sungars, stockades, or whatever may be most suitable, and the whole field around clear for fire without any danger of firing into the piquets in their posts or on them as they retire if driven in. The favourite tactics of all hill men are night firing into camp; it causes great annoyance to the troops, and is beset with but little danger to themselves. Every means of counteracting this nuisance should be taken. A few Goorkhas or Pathans, let loose from camp on the "*shikar*," often make a very respectable bag of these night visitors, and it has a good effect. It is a mistake, however, to return the fire from camp, and if the tribesmen find after a bit that they inflict no loss and that no notice is taken in camp of their "firing parties," the game will soon be dropped. It is therefore a golden rule that sentries should not open fire at night except in some sudden emergency, as constant firing round the camp only unnecessarily alarms and disturbs the force, and the result, even though it be a few corpses strewn round the camp, is of no value whatever compared to a quiet night.

When out-lying piquets are necessary, they should not be posted at any great distance if it can be avoided, and the communications to them should be made as practicable as time will admit. Supports and reserves to piquets are very seldom required in hill warfare, but, where necessary, their position should always be fortified as well as that of the piquet. The in-lying piquet in camp should bivouac apart from the other troops.

Sentries must trust as much to the sense of hearing as to their eyesight, and should be very careful not to unnecessarily alarm the camp, unless positive that the enemy is advancing in force. This is not so easy as it sounds, and to those who have done piquet duty in the mountains on dark nights when an attack has been expected, in a country where, from rushing water of river or stream, wind rustling in the trees, rocks and stones rolling down khuds, dislodged, may be, by stray cattle or wild animals, strange sounds from stranger birds, beasts, and insects, and manifold other little incidents, the difficulties of the position are fully appreciable. From intently listening and listening, may be, intensified by a few shots and perhaps a shadowy outline moving through the darkness, a man's nerves get unstrung, and it is by no means easy to dis sever the real from the imaginary.

Sentries should always be double, if not treble, and never be posted in places where they can be cut off. If a point of observation has to be occupied outside the line of piquets, it is better to put a detached post there. The perambulating up and down of sentries is quite out of place and dangerous in mountain warfare, as the men cannot see so well when on the move, and it gives the enemy a mark to fire at. The best plan is for the two men to arrange for one or two suitable spots well covered and protected, from behind which, either standing or sitting, they can get a good view without being seen. A bonfire of pine logs or dry bamboo leaves about 50 yards in front of the piquet is useful on dark nights. Patrolling is often impossible and oftener undesirable in hill warfare. When a piquet is posted on high ground with steep, precipitous, but climbable, ground in front, which cannot be observed, a collection of boulders ready to roll down on the enemy if they try to creep up under cover of the cliff, is a most satisfactory means of "hoisting him with his own petard."

Shelter for troops either from heat, cold, or rain is most necessary. It is a question that affects medical and transport departments inversely, but I think it will be generally admitted that it is wiser, rather than run the risk of a heavy list of sick, to put up with a longer string of transport animals, and a consequently slower advance.

In the majority of our small hill wars, the troops as a rule proceed to the Base on Field Service Equipment Scale, '91 and

thence onwards the reduced scale known as Hazara Field Force '88 Scale, when their waterproofs sheets take the place of tents. When extreme cold or heat is to be expected for any length of time, tents must be taken; this was recognized in the Miranzai Field Force '90 (cold) and the Isazai Field Force '92 (heat), on both of which occasions tents were taken. For hospital purposes of course tents are always carried.

As a rule, however, in mountain wars the troops bivouac, and that the life is healthy, and that men, *if fit*, can stand it in spite of cold and rain, is more or less proved by the sick returns of Hazara Field Force 1888 and 1891, Zhob Valley F. F. 1890, and Miranzai F. F. 1891. Men soon become very handy at rigging up shelter for themselves; timber from forests or village houses, bamboos and branches, generally being available, and with the assistance of a good waterproof sheet of proper dimensions a very snug little cover may be made. I would, however, suggest that the waterproof sheets be issued $2\frac{1}{2}$ by $1\frac{1}{2}$ yards with eyelet holes (very strong) round the edges. This gives sufficient cover for 2 men both sheets over-lapping. Or one sheet can be used as shelter for a single man. Four small rods 3'9" long, two of which are joined by a brass slot in the centre, forming a ridge pole, the other two the end poles, with the addition of log line (which should be issued in 15 ft. lengths) add but very little to the weight and make the bivouac a reliable and dry shelter in wind and rain. These rods are now kept on stock for this purpose by six regiments and four batteries that I know of in the "1st Division All Arms," who have learnt their value by experience. When the force halts any time, mud walls, plaited bamboo branches, doors of houses, beams, or stone walls, can be made to a height of 4 ft. or so, over which the waterproof shelter can be pitched, and the triangular open ends of the bivouac being filled in, a diminutive palace is provided at no cost and small labour! (Vide sketch marked N).

In Lushai the question of shelter was of course more than usually important owing to the damp nature of the country and the heavy rains, but there the hill coolies worked wonders; ten men would run up a "*basha*" for 20 sepoy in 3 to 4 hours, the *basha* being a hut, sloping roof, front 6' back 4' 9" wide, closed on three sides. The *Chakma* coolies were particularly handy at this work; they work very quietly in gangs, each man knowing his part of the job, require no tools but their dhaos, and bamboos furnish every requisite; uprights, rafters, and floor joists being whole bamboo, matting for floor and side walls of split bamboos, lashing of strips of bamboos, roof bamboo leaves; these roofs kept out the sun by day and the heavy dew by night. Really sound waterproof roofs can be made out of cane leaves with a covering of split bamboos. A waterproof sheet or tarpaulin over the roof,

fastened down by strips of split cane or bamboo, completes a hut warranted to keep stores dry in the wettest weather. All huts built in malarious countries like Burma, Assam, Chin-Lushai, must have machan floors (raised off the ground).

Gujar's huts, villages, sheds, &c., although giving good cover and roomy quarters, are snares and delusions, unless one is fond of the company of what Webster describes as "a small insect, remarkable for its agility and troublesome bite." Touching this subject whether bivouacking in or even near villages, the following "Note" for all those proceeding on service on the N. W. Frontier is valuable—" *Sourtout n'oubliez pas la poudre Keating.*"

Road-making plays an important part in all our mountain wars in India, as in the great majority of cases we have to cut roads and pathways before the troops can advance ; and for this reason Sappers and Miners or Pioneers should be the first troops to arrive at the Base.

As in the first place the tracks required have to be pushed on as the advance proceeds, it is usually best to take the easiest line, though it may be a bit longer, and re-align the track and improve it at leisure afterwards. Roads in the mountains are usually made 6ft. wide with here and there spaces of 10ft. to 12ft. when the soil is easy, to facilitate the passing of convoys. A plentiful supply of guncotton and powder is necessary for blasting rocks and removing trees.

The light entrenching tools are quite unsuited for hill work where excavation is difficult. Those of this pattern that were issued to the Hazara F. F. in '88 were continually breaking, both picks and crowbars, and had to be replaced by the ordinary heavier kind.

In countries like Burmah and Chin-Lushai when cutting through dense jungle, kookries or dhaos for all followers, as before mentioned, are very necessary aids. The great difficulty here lies in the removal of the long bamboos when cut, as they are held up in their places by neighbouring trees, bamboos, and creepers, and, if not removed at once, fall later on and obstruct the road. The sides of the roads too, in damp climates, should be cleared of jungle for about 4ft. to 6ft. to prevent dew falling on the pathway; this was not done in the first instance on the Demagri-Lungleh road in 1889, and in consequence the track became so slippery that neither elephants nor mules could move on it.

When zig-zags have to be made, the road-making parties should be told off in such a manner, that when rock-blasting and excavation are going on above, there are no parties working, or troops or convoys moving below. "Warning sentries," when blasting takes place, should be posted a good 50 yards to either flank.

Signalling in mountain warfare may be said to take the place of the cavalry screen with an army working in the plains. It is to our signallers that we have to trust implicitly for accurate information from the front, which may be but 2 or 3 miles as the crow flies, but which would take an orderly mounted or on foot many weary hours of toil and trouble, were it necessary for the message to be brought by hand across roaring torrents, up steep khud sides, and over rocky promontaries; whereas by means of signalling, the message speeds "as the crow flies" o'er hill and dale in the twinkling of an eye.

According to the manual the means of conveying intelligence in the field are now classified as—

1. Electric Telegraph.
2. Visual Signalling.
3. Mounted orderlies.

To this I would add one more, viz :—

4. The Telephone.

Which latter has on more than one occasion proved its utility in the field on our frontier. I will take each *seriatim*.

Firstly comes the Electric Telegraph, which may be again divided into three systems namely,

- (a) The advanced system.
- (b) The semi-permanent system.
- (c) The permanent system.

The advanced system is the one we are most familiar with, as it is more prominently brought to notice in our operations across the frontier. It consists of the lightest material possible for purely temporary lines, and is, roughly speaking, capable of keeping up with a brigade when marching in hilly country. Eight to twelve miles a day is about the average speed with which the wires can be laid, though I have known a line of 7 miles completed in 6 hours. This, however, may be taken as exceptional. Still from the above it may be inferred that there should as a rule be no difficulty in keeping the head-quarters of the force in telegraphic communication with the Government of India.

The progress of the advanced system of the electric telegraph of course mainly depends on the nature of the country. For instance in tolerably open country or country but sparsely wooded, no matter whether the hill sides be steep or sloping, it will generally be found that the head-quarters telegraph station is opened by the time the G. O. C. Force has need of it. This was the case on several occasions during the Black Mountain expeditions of '88 and '91 (on the arrival of the main body at Dubrai in '88, and at Kotkai, Palosi, and Derbanrai in '91).

On the other hand the difficulties to be overcome by the telegraph department in the advance on Lungleh from Demagri (Lushai) in '89, where the country for 40 miles consists of undulating hills, whose sides, steep in some parts and sloping in others, are thickly covered with impenetrable jungle of bamboos, creepers and forest trees, and where the only means of getting a tolerably good road is by following as far as possible the direction of the watersheds, a method that naturally produces, when several ranges have to be crossed, a narrow and serpentine track, and the progress of the head-quarters office to the front consequently delayed.

The advanced system of telegraph in the field, passing through countries inhabited by half civilized and wild tribes, will always be interrupted from time to time by the line being cut. Natives of all kinds on our frontiers have a natural horror of this thin wire they see stretched across their domains, and no matter the cause, whether hostility, pelf, or pure devilry, they are sure to give trouble in this way.

The semi-permanent and permanent systems call for no exceptional remarks as regards mountain warfare.

While discussing, the subject of field telegraph it will be as well to consider the telephone at the same time, as that portion of army signalling in the field is worked by the telegraph department, and completes what may be called the oral portion of the scheme for the transmission of messages in the field.

The chief advantage of the telephone is, undoubtedly, its suitability for opening a channel of communication between outlying piquets, detached posts, and the main body; and experience shows that it is capable of being usefully developed in this direction.

We now come to item 2, which includes signalling by flag, lamps, and helio. Visual signalling in fine weather has great advantages over oral. It requires but little material, a small personnel and transport, and is more suitable and quicker in operation where the country is stiff and the going bad, than the telegraph; moreover there are no wires to be cut by the enemy. In our mountain wars visual signalling is seen at its best: the more lofty the ranges, the easier becomes the work of the signalling officer. In Afghanistan in 1878-80 the helio played a most important part in our successful operations, and especially elicited praise from Major-General Soboleff in his demi-official publication on the war*; and as the gallant General is an advanced Anglo-phobe, his remarks are worthy of note.

In the Black Mountain, where the country lends itself readily to the formation of excellent stations, perhaps it is seen at its

* Vide "Anglo-Afghan struggle", by Major-General Soboleff, Russian General Staff, volume II, Section 18, the heliograph. Translation by Major W. K. Gowan, Calcutta 1885.

best. In Lushai and Burmah, owing to the dense forest and undergrowth, and the nature of the hills, which are more of the denudation than the upheaval type, the selection of posts is a more difficult matter, machans and tree trunks having very often to be used to ensure a clear view of the country.

It may be taken for granted, that except in the case of very rapid movement or very difficult country, the field telegraph will be able to keep pace with head-quarters. This leaves the entire personnel of the visual signallers free for work on ahead well to the front. I will not go into the question of the insufficiency of regimental signallers and equipment, or the duties of signalling officers, but would refer the reader to a most excellent paper on this subject in the Journal of U.S.I of India, August 1892*.

Signalling (visual) stations are usually divided into three classes, *viz.*, permanent, semi-permanent, and moving.

Permanent stations may be taken roughly as those that are occupied with the head-quarters of the force or brigades, and when there is a likelihood of their remaining for some few days, though of course the term "permanent" is subjective entirely to the peculiar circumstances of the campaign. Semi-permanent stations are those occupied for a day or so; for instance, a party making an expedition across the hills of one or two days duration and fixing its head-quarters at some spot within call of the head-quarters of the force or brigade, would have a semi-permanent station, while small parties proceeding along the crests would have moving stations attached to them. Moveable stations employed thus on mountain warfare have proved of the greatest service, especially if the reconnoitring or foraging party is for a time hidden from view, while passing through pine forests, jungle, or on the far side of mountain spurs, it is only by an occasional flash that its whereabouts is made known to head-quarters.

One of the most important uses of signalling in mountain warfare, whether by helio, flag, or lantern, is the keeping of the main body fully acquainted with all that has been seen or heard from the outposts, advanced, rear, and flank guards. In signalling with lamp, however, from piquet to bivouac, care should be taken to prevent the light being visible from the front, as this acts as a guide to the enemy, and moreover serves as a target for their rifle or matchlock men, as our signallers soon discovered when working at Mana ka Dana, Chittabut, and Thakote in '88.

Visual signalling is entirely dependent on the nature of the country and the state of the weather. Rain clouds and mist are of course fatal, and when the elements are unpropitious and there is

* "The most effective tactical use that can be made of signalling on a modern battlefield". Captain F. Hamilton, The Queen's, Inspector Army Signalling, Bengal.

no line of telegraph, the only possible means of communication is by orderlies ; these, as generally understood by the term, *viz.* troopers or sowars, are, with very rare exceptions, out of place in mountain warfare. A man mounted on a trustworthy mule is worth half-a-dozen on troop horses, and can get over rough and steep ground much quicker. On occasions even mules are out of place, and when nullahs have to be crossed, steep khuds climbed, the message may have to be taken by a man on foot, a tedious and unsatisfactory procedure.

This briefly describes the various methods of conveying intelligence in the field and the system at present employed in mountain warfare as regards India.

Army signalling in the field is without doubt of the greatest importance in mountain wars. Lives have been saved and a successful termination of an expedition obtained on more than one occasion, due in no small measure to timely intelligence received through our signallers. Often and often, however, one has heard it remarked, that it would be a blessing if the telegraph wires to India from head-quarters of a force could be cut, and the G. O. C. left unfettered by orders and questions emanating from Secretary of State, Foreign Office, or Army Head-Quarters. Without doubt there *have* been cases when it would have been better had the telegraph instruments with the force been put "*hors de combat*" *pro. tem.*, but still these are drawbacks, which in a well regulated government should not occur, and are so infinitesimal as compared with the advantages of a well organized scheme of telegraph and visual signalling, that no experienced commander would ever care to embark on an expedition with incomplete means of disseminating intelligence both to and from the front.

A great deal has lately been written on the subject of eleva-

Rifle and Gun Fire in mountains. tion required for different distances when firing up or down hill, and all sorts of calculations are made to arrive at the exact difference of sighting required.* The idea, however, of going into these details on actual service is of course out of the question, even presuming the actual range was accurately known, which is impossible. Suffice it, however, to say that it is useful to know that whether firing up or down hill less elevation is required than when firing on a level plain, and that again, less elevation is required when firing down than when firing up hill. Still, except for long range volleys, such details are not required ; the great thing is to get the men to fire low, and with the new Lee-Metford fixed sight, to habituate them to fire at the enemy's feet. Ninety per cent of shots fired on service in the hills are said to go high, principally due to over-estimation of range. Whenever infantry moving

* Musketry fire in the hills, by Major A. J. Watson, Suffolk Regiment Journal of U. S. I. of India, 1889.

into action pass a battery in action, they should invariably enquire of the gunners what they have found the range to be; this is not always done.*

Mountain battery screw guns are *facile princeps* the artillery for purely mountain warfare on steep ground. They are mobile, and can practically go where infantry can; they carry 144 rounds per gun (of which 33 are case), have a range of 3,200 yds. with "time", and 4,000 (or really as far as can be seen to lay correctly) with percussion fuze. They can come into action, each gun, in about a minute, and can "limber up" again (load on to mules) in about 46 seconds. To secure more elevation than is possible to get from the gun itself, as is at times required, the simple method of digging a hole for the trail, as was done by No. 1, M.B.R.A., at Bela Pirzada in '91, meets the difficulty.

As regards heavier guns, though much used over practicable ground in mountain warfare, they call for no *special* remark here, save the golden rule of the massing of batteries wherever the hill sides admit of it.

Boats and rafts have played important parts in our hill wars in Afghanistan, Hazara, Lushai, &c., and are often very necessary to enable operations to be carried on. On the Kurnafulie (Lushai Field Force) as far up as Rangamatti, the steam launch "Chaffinch" was of the greatest assistance; beyond that, owing to the rapids, the only boats used were the ordinary "dug outs" of the country, and they answered fairly well, though, especially at Peski-Surra and Burkul, a larger stamp of boat would have been useful. I have never seen collapsible boats employed on service. They are made in large sizes, are easily carried, and should I think be worth a trial, certainly in places where boats are not obtainable.

A useful boat on the Indus or Kabul river would be a species of flat-bottomed, stern-wheel steam launch drawing about 18 in. or so of water, and capable of holding about 30 riflemen and a machine gun, with bullet-proof sides and roof, and an arrangement of loopholed shutters (Vide sketch marked O). Such a boat as this would have been invaluable during the operations in the Lower Hassanazai and Thakote valleys.

Rafts of timber, bamboo, casks, and *mashaks* (goat skins) are all useful. *Mashak* rafts were used to a considerable extent in Afghanistan and the Black Mountain. They are easily made up, the material is portable, and moreover can without much trouble be easily repaired. I remember bringing some sick and wounded down from Jellalabad to Dhakka in '80 on a *mashak* raft, and although several

* Prince Kraft. Letters on infantry, Letter XI, page 158.

of the *mashaks* got cut by the rocks above Elachipur, the raft was repaired quickly and without much difficulty, though under a dropping fire from the opposite bank at the time. The arrangement of a "charpoy" on *four mashaks* makes a first-class means of conveyance, and on the North-Western Frontier the materials are generally obtainable locally.

Some sort of bridges are required in all our mountain wars, whether to cross rivers, streams, or chasms. They generally have to be constructed of material at hand, which, with the assistance of rope and telegraph wire, probably meets all wants. In cases where a considerable width of swift flowing river crosses the lines of advance, a strong boat, pontoon, or raft bridge is necessary, and on the Indus or the Kabul, this can always be arranged for; and there is yet a supply of boatmen to be had at Attock who are adepts at this sort of bridging work. Since, however, the iron bridge over the Indus was built and the bridge of boats and ferries done away with, the class of men required for this work is gradually dying off, and were it not that Government have foreseen the loss this would be in the hour of need, and have determined to periodically conduct bridging operations so as to keep these boatmen employed, the old race would most assuredly die out 'ere many more years have passed. A bridge of boats similar to the old Attock Bridge was thrown across the Indus at Kotkai in 1891 in two days (vide sketch marked P); the labour of bringing up the boats from Nowshera and Attock was, however, considerable.

Another description of bridge used in this campaign with great success was the flying bridge constructed (as was also the bridge of boats) by Major P. Buston R. E., at Bakrai. A description of the travelling block used and the way the boats are worked is given in the sketch marked Q. The travelling block runs along the wire cable across the river; two ropes go from it to the stern of each boat of the raft. When the ropes are the same length, the raft is motionless, as the stream acts on both boats the same, but when one is tightened and the other loosened, the current acts on the boat whose stern rope is tightened, and thus the motion in the required direction is obtained. To check the raft the tightened rope must be loosened. It is astonishing how rapidly the raft travels in a stream like that of the Indus.

For crossing nullahs, pine trees thrown across with the ends fixed firmly in rocks with cross timbers and grass for roadway make good bridges, as also do single and double lever bridges made of trees or bamboos. Rope bridges after the Kashmir pattern are useful when no others are possible.

In Lushai, Burmah, and places where the bamboo is plentiful, very good bridges for mule traffic can be made of them. They look fragile, but stand work well. A number were made in Lushai in '89 varying in length from 15 to 40 yards. All the necessary material was found on or near the spot, the roadway being made of bamboos opened out after the fashion of a wooden kettle holder; the uprights, baulks, railings &c., of whole bamboo, the lashings of split cane. The hill coolies, especially the *Chakmas*, were very handy at making these bridges.

In working in the Field across our frontiers, timely intelligence and po- gence of the movements and intentions of the tribes is most essential. The burden of this work devolves on the Political Staff, and the Intelligence Branch of the army must work hand in glove with them, if any proper work is to be done. Spies of course innumerable will be found from among the tribes hostile and other, but as in nine cases out of ten their reasons for coming into camp are to find out what news they can, and make money by serving two masters, their reports have to taken very much "*cum grano*", tho' at times, if the political officer is well in touch with the headmen across the frontier, a certain amount of useful information may be obtained. The *quantity* is never wanting. The difficulty lies in sifting the wheat from the chaff. The best information is generally that obtained by native soldiers of our army, who have on many occasions given proof of loyalty to their salt on these delicate missions.

The officer commanding the force must be the supreme political authority to decide knotty points on the spot, advised of course by his civil political officer.

There is a large field in all our frontier wars for work in the Intelligence Branch of the Quarter-Master-General's Department, and Field Intelligence Officers should fully understand the duties expected of them. They should always, when possible, be able to converse in the language of the country, as often with some foraging or reconnoitring party they may be able by casual questions to villagers to obtain valuable information. Their duties do not, however, lie entirely with the present, but also with the future; every scrap of information that may be of future use should be recorded by them; notes *re* tribes, headmen, villages, roads, paths, water, forage, encamping grounds, and what not, for one can never tell whether our forces may not be again, years hence, working over the same ground. This is not always done, and I have known a case when had proper work been carried on in the first instance, an enormous amount of unnecessary labour, especially to the C. R. E., would have been saved. Every road and encamping ground should be fully reported on, accompanied when possible

by plans and freehand sketches, which years hence, when pre-chance those of the force then employed are dead and gone, may prove of greatest assistance, should fortune take our troops over the same country again. The roughest of sketches are useful, as for example, those made of the Thakote route in '88 (vide sketch R, being section 7 of the Thakote route); and together with a report are all that a commander needs to show him the way.

I have no knowledge whether balloons have ever been used by us in mountain warfare, but I fancy not; anyhow the experiment would be worth a trial. I have known cases when a captive balloon connected with head-quarters by telegraph wire or flag signal would have been of greatest assistance in keeping the commander informed of the whereabouts and dispositions of the enemy, beyond a range of hills or concealed behind a ridge to front or flank. With all the modern improvements in military ballooning there should be no difficulty in employing them in the mountains, and in our next big war across the frontier they should form valuable aids to the Intelligence Branch of the army.

I have now, as far as the limited space allowed for the discussion of a subject of such magnitude as

Conclusion. "mountain warfare as applied to India" will admit, touched on the more important points connected therewith. It stands to reason, however, in a subject such as this, where the several conditions under which mountain warfare has been and can be waged are so varied and complex, that it is without the range of any ordinary mortal to arrive at any definite conclusions as to what should or should not be the particular strategy or tactics of mountain warfare as applied to India, as time and circumstances can alone decide.

It is, however, possible to divide mountain wars in India under two great heads, viz :—

(1) Campaigns undertaken to defend our position and uphold our prestige in India.

(2) Punitive expeditions.

In the former of necessity we must put forth our whole available strength, as the issues are life or death to our rule in India. Every *minutia* of our power must be strained to its utmost, for to a moral certainty we have in this class of war to contend against fearful odds.

Our every available gun and rifle must be brought into play, and our infantry carefully reserved for the final onslaught of the battle by scientific use of our guns to prepare the way for attack from positions well chosen, which will give us the advantage of ground, in some way equalizing the advantages of the foe as to numbers. An active policy, as advocated in note (1) of my

section on "the attack", is above all things necessary, for political problems are intricately interwoven with those strategical, and on them the active or passive measures adopted have a marked effect.

In the latter class, *viz.* punitive expeditions, the plans adopted must in a way vary from those of the former. The active policy is as necessary as ever, but the means adopted to pursue it are different. We are not fighting on these occasions against an enemy well-armed and superior in numbers (*i.e.*, to our *available* forces), but as a rule against ill-armed and undisciplined tribes; and the object is to inflict punishment on them, not to defend our own position, though may be to uphold our prestige.

When tribes decline to carry out their agreements with the Government of India, stir up strife, or commit murders on our frontiers, they must be dealt with summarily like children. "Whilst any hasty exertion of physical pressure to the exclusion of other methods of adjustment is confessedly impolitic, there is a point beyond which the practice of forbearance may not be carried. As without physical force in reserve there can be no governing power, so under extreme and repeated provocation its non-employment is not distinguishable from weakness".*

The orders of Government having once been given, the tribes must be made to understand that it is a case of obey, and operations will cease; or, disobey, and punishment swift and sure will follow. When on the 2nd November 1880, in hope of gaining time and negotiating after true Oriental fashion, the Marri chiefs came in to see Sir Charles MacGregor, he absolutely refused to discuss the matter. After recapitulating to them the terms, and explaining what he should do in case they were not agreed to, he concluded as follows:—"Yes or no, in one hour. You must either fight or obey the orders of Government. For myself I do not care much which you do, my troops will be very glad if you fight. Now go away and settle matters." This speech had the desired effect, and is a very fine example of the way, and the only way, to deal with Orientals.

There is one other point regarding punitive expeditions that I think calls for note. It is this. In order to achieve the purposes of a punitive expedition, it stands to reason that the tribe must be *punished*, and to do this effectually we must inflict on him losses in men, material, and money; the latter two it is possible to do without actually meeting him in the field, but the moral and lasting effect of the first is intrinsically of far greater importance than the latter two, and to ensure this we must get at close quarters with him. Now, armed as

* Note on our dealings with North-West Frontier tribes by Mr. Davis, Secty. to Government Punjab, 1864.

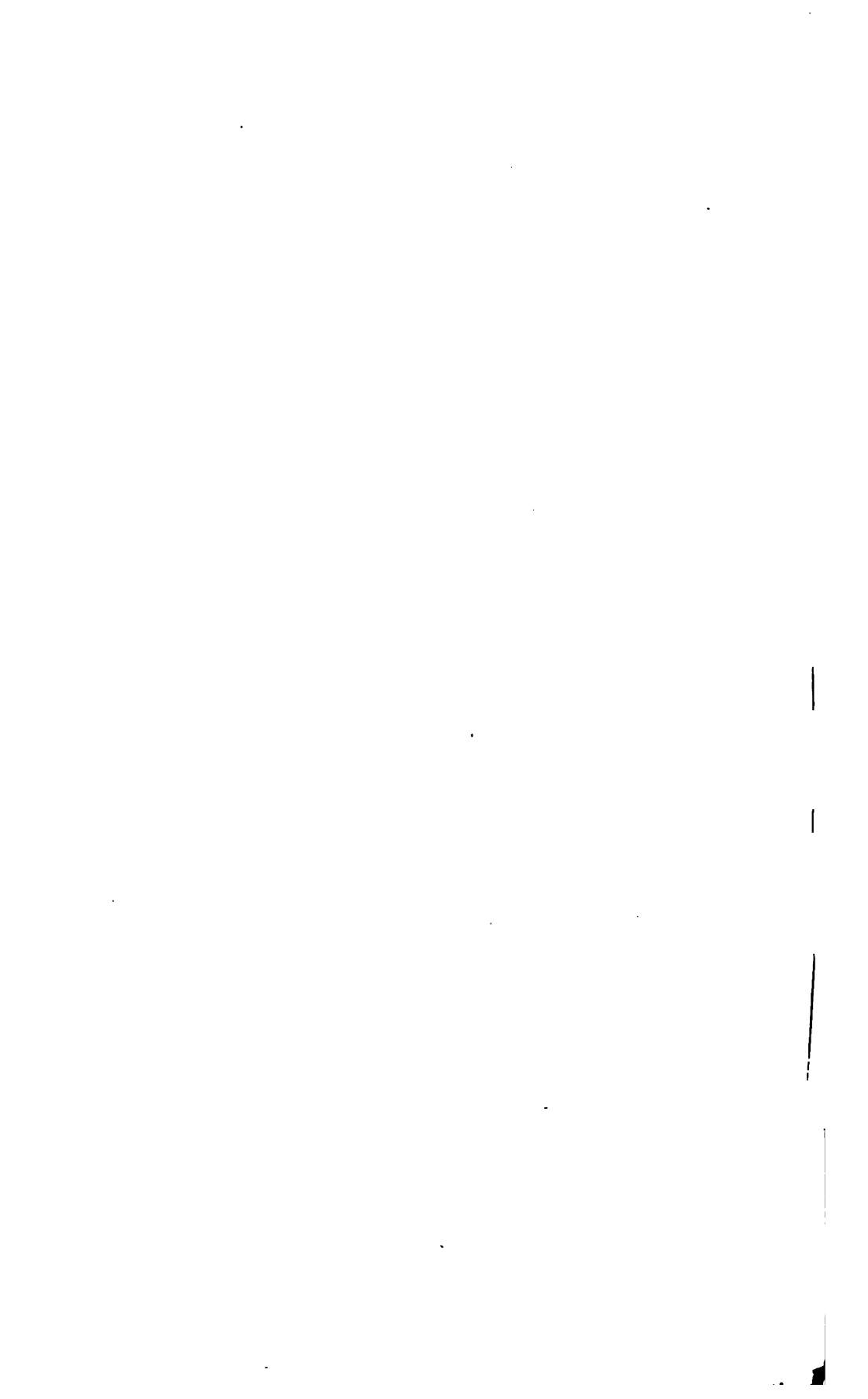
we are with long range guns and rifles, experience has shown that mountain tribes are year by year less inclined to meet us in the open; the mere firing of shells and long range volleys at the opening of a campaign keeps them at a distance, and instils in their minds a very natural fear of combining in any numbers in the open to offer resistance to our advance; the result is that the main difficulty nowadays in punitive expeditions is *to get at the enemy to punish him*, his tactics being to move off as we advance, contenting himself with desultory and harassing fire into camp at night, and leading us with all our paraphernalia of war on a wild goose chase over rugged hills or through thick jungle.

It has been argued by those qualified to judge in the matter, that guns should be brought into use as early as possible in a mountain campaign, in order to paralyze the enemy at the outset. Now on this point, as regards punitive expeditions, I venture to disagree, as I think by commencing operations in this manner, we at once destroy our chances of ever inflicting any serious loss on the enemy. Rather would I recommend in this species of warfare, that at the outset the enemy should not be unnecessarily alarmed by long range volleys and bursting shells when he is a mile or so away, but that he should be as it were encouraged by our seeming inability to strike him afar, until worked up to a pitch of excitement and belief in his own capabilities, he is at length drawn on to fight in large numbers at effective range. Then is the time to strike a blow; and though it may seem bloodthirsty, the mowing down of a few hundreds at one fell swoop is a far more politic and humane method of dealing with him than killing off small numbers here and there at long ranges, and working havoc to his homes and harvests. Therefore I would say in punitive expeditions, keep your guns and long range volleys until you have met the enemy in masses within easy effective range, and then, when he has been mown down and repulsed, carry on your successes to the bitter end by following him up *at once*, and using guns and rifles to their fullest extent.

The probable result will be, that having been thoroughly hammered, the tribes will be but too eager to come to terms, which in 9 out of 10 cases they will not do, if physical force is made subordinate to verbal and written overtures; the golden rule with Asiatics being to hammer them first and then dictate terms, and by this method only will a speedy, satisfactory, and lasting settlement of the frontier be obtained.

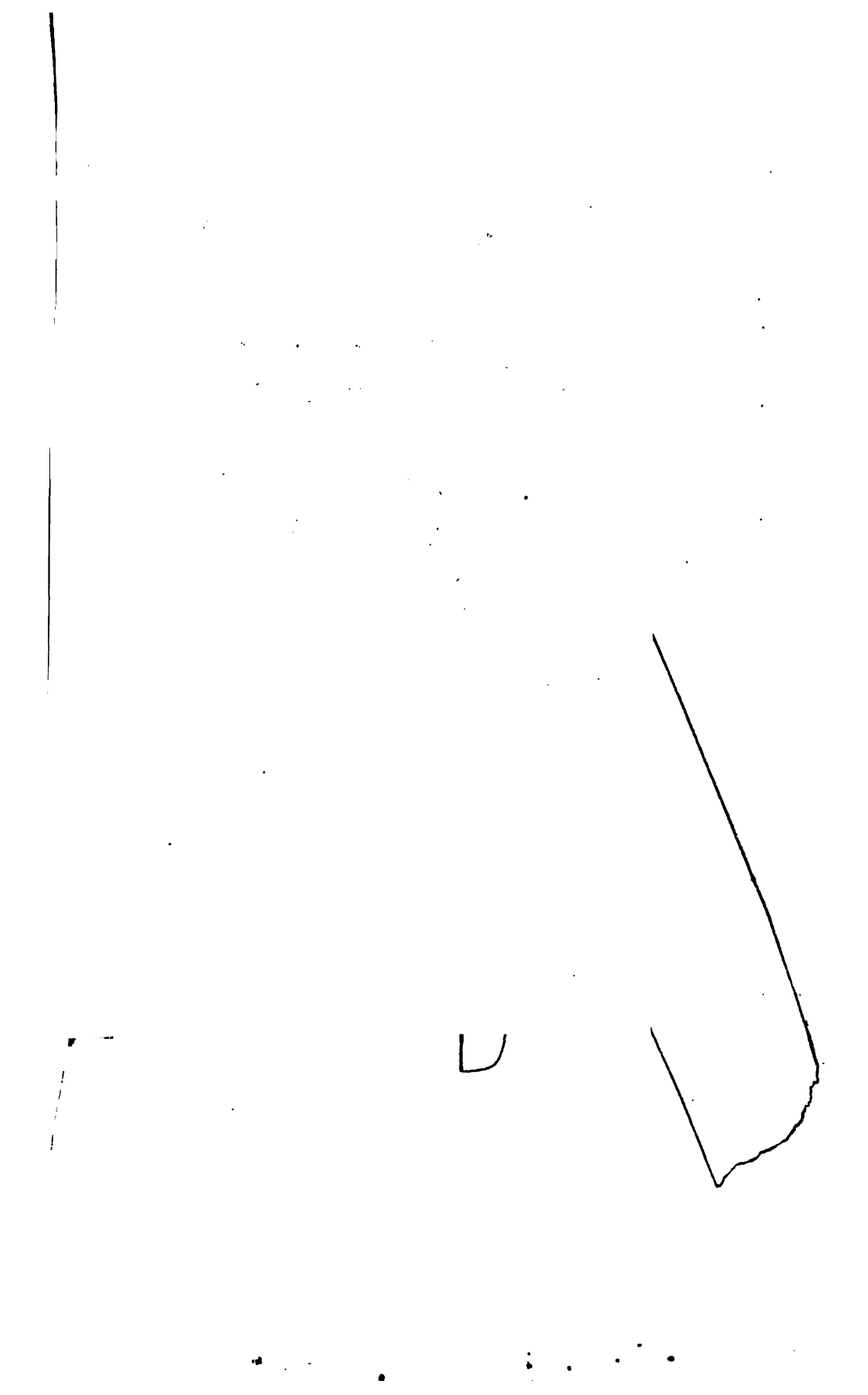
Finally, I would add, before the day of issue arrives when across our border lands we have to meet, may be, the hordes of Russia and Central Asia marching under the shadow of the

Imperial Eagle, let us do all within our means to consolidate our power and prestige within the limits of Hindostan, and along its vast line of frontier land; let us train our men to overcome the multitudinous difficulties and hardships of mountain warfare; let us put the machinery of our military engine in thorough working order, that when the day of decisive battle arrives, we may advance with our full strength, thoroughly trained and equipped, our rear resting on the loyalty and cohesion of the native states, the frontier firmly rivetted by strong lessons of the past, and the future with no dark cloud of uncertainty looming in the distance, but the road clear and straight to victory, honour, and the consolidation of our Empire in the east!



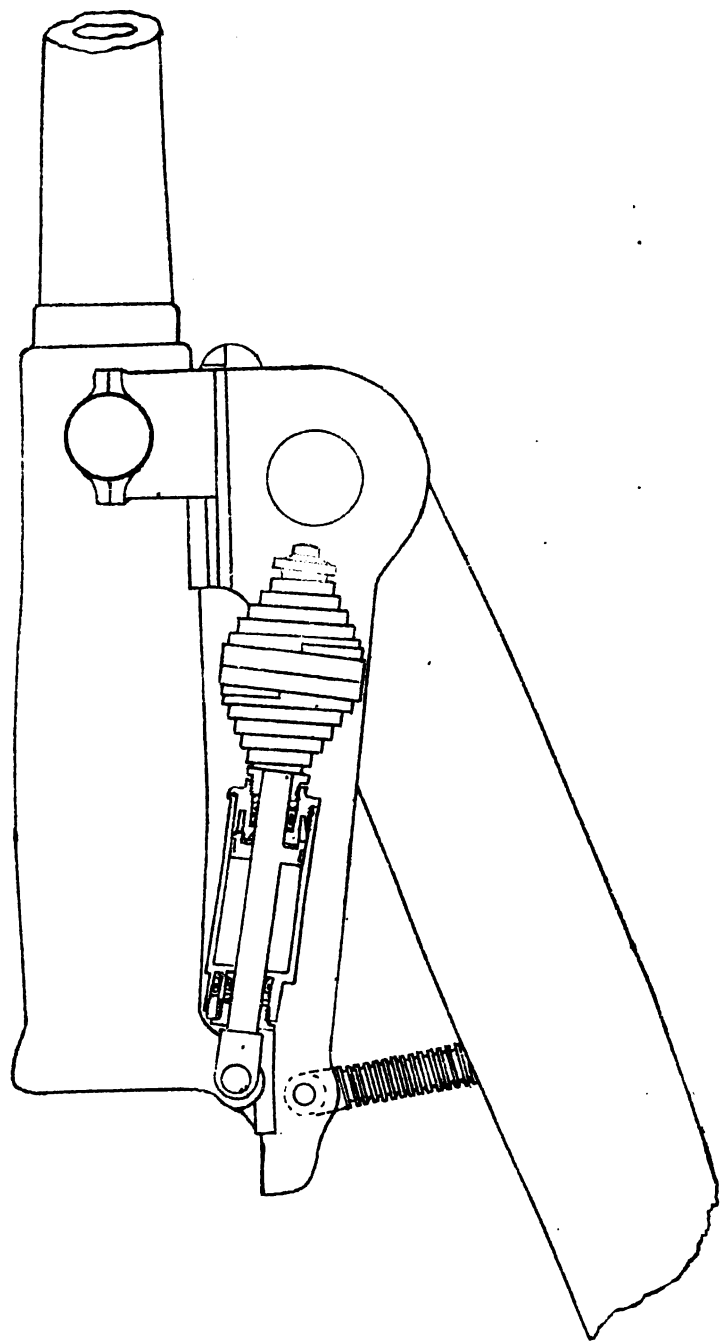
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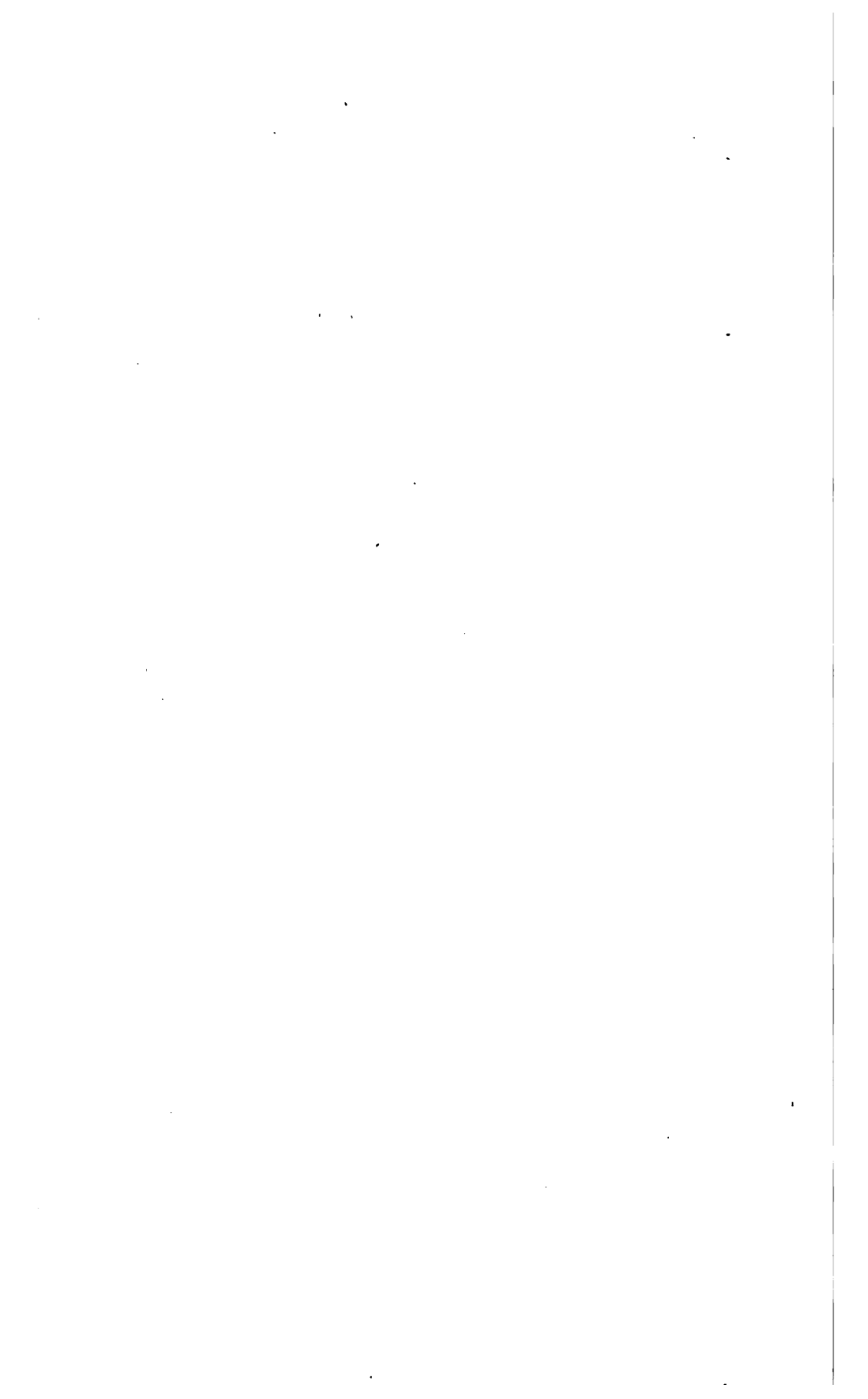
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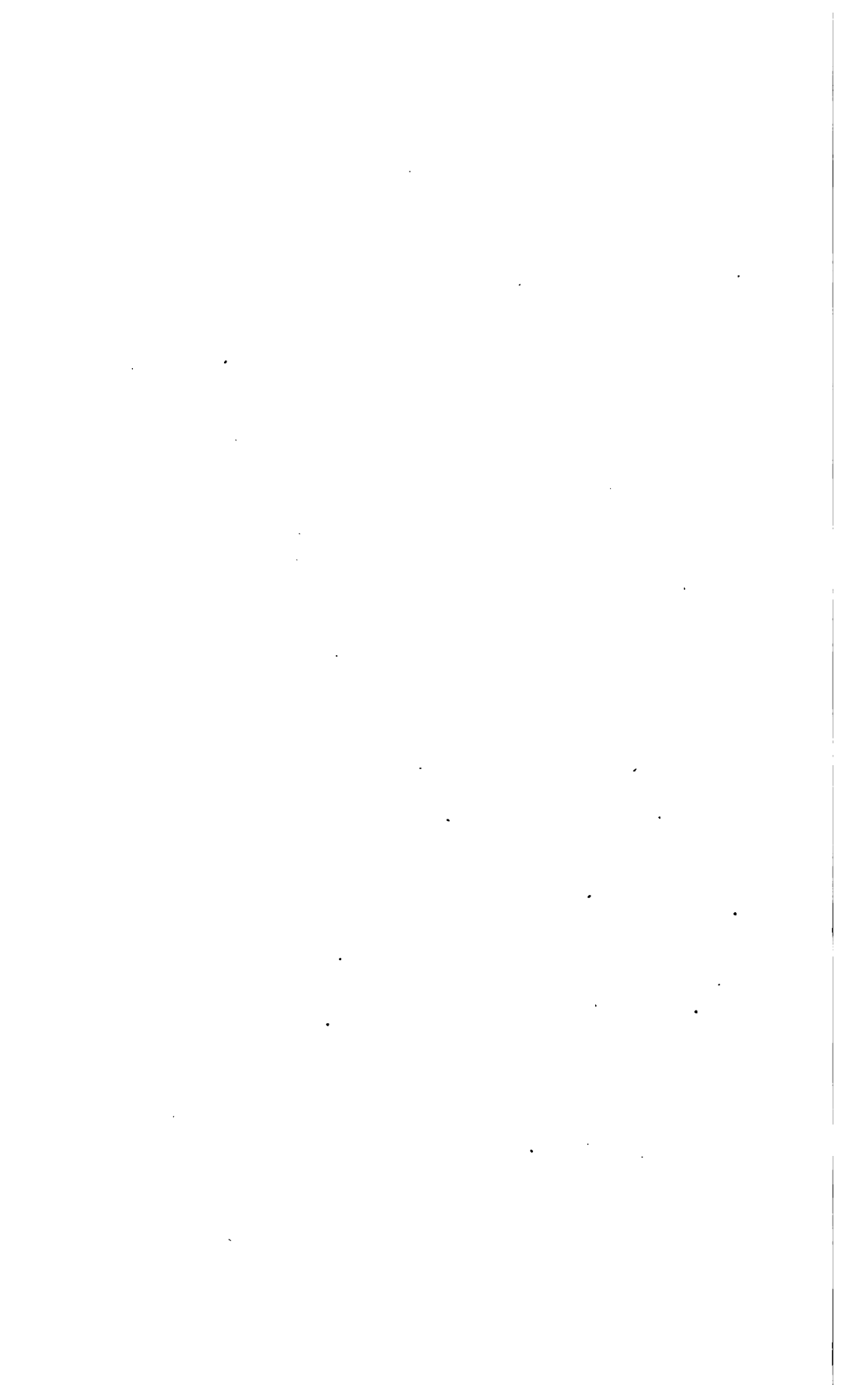


12 P^a B.L. MARK. II.

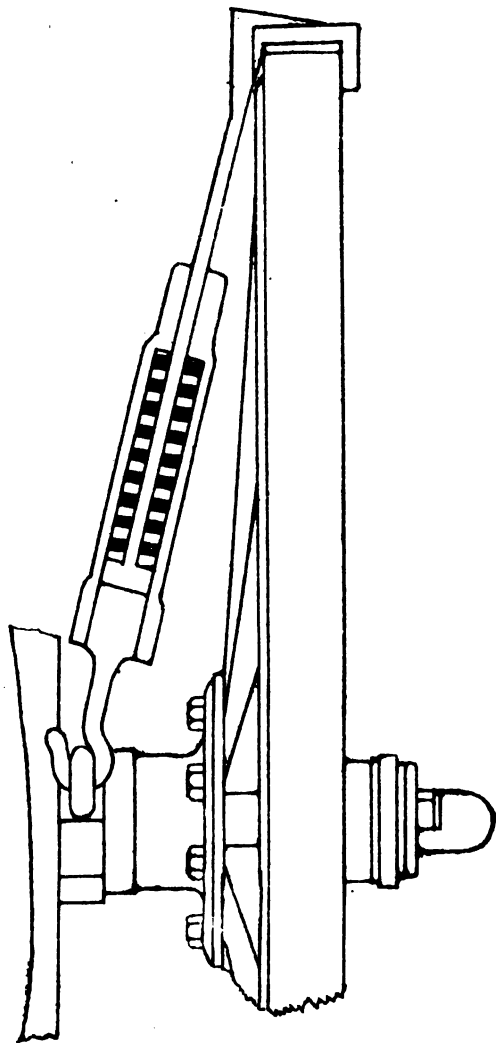




W



U.S. BRAKE



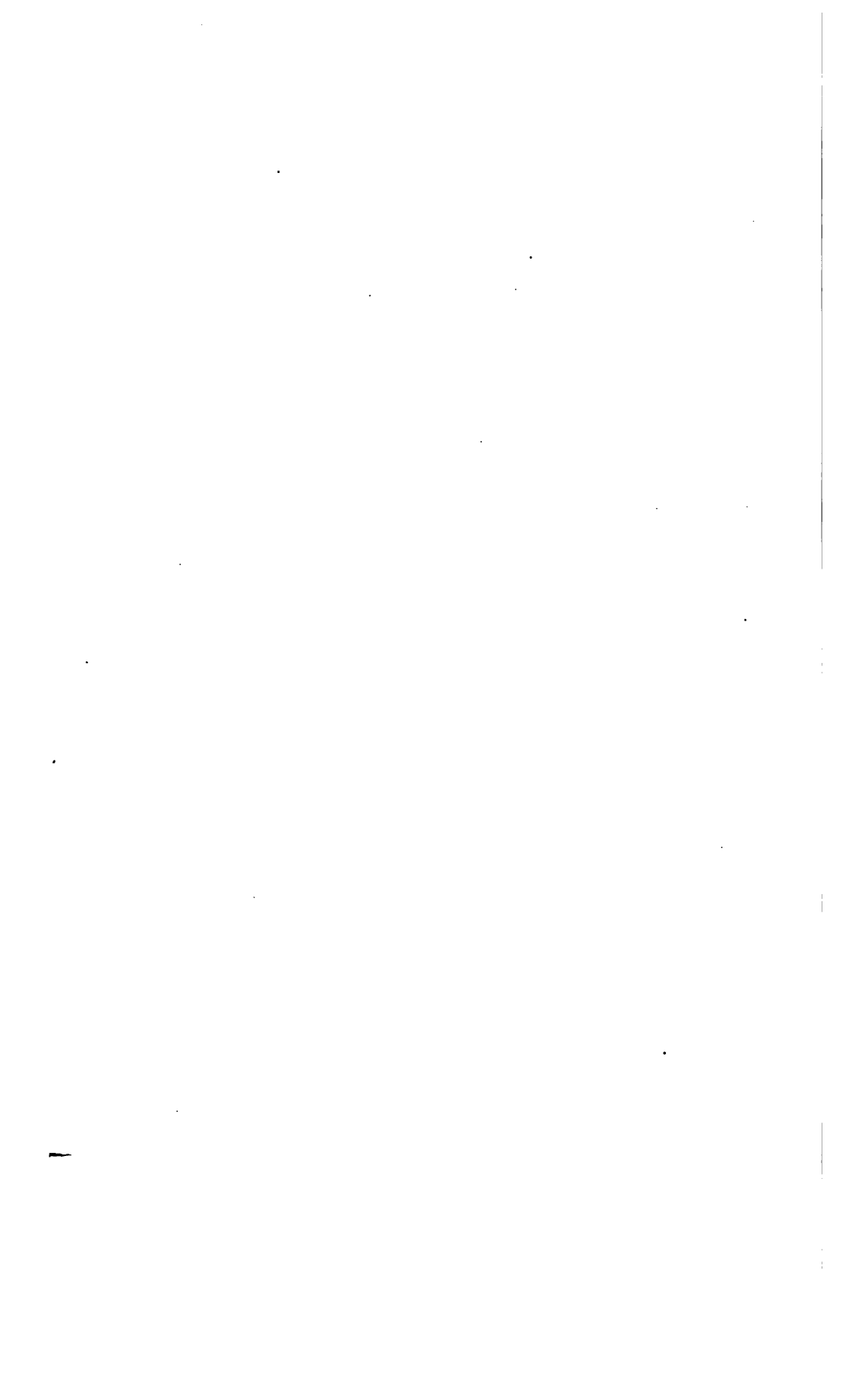


Plate. 6.

PROPOSED HYDRAULIC BRAKE

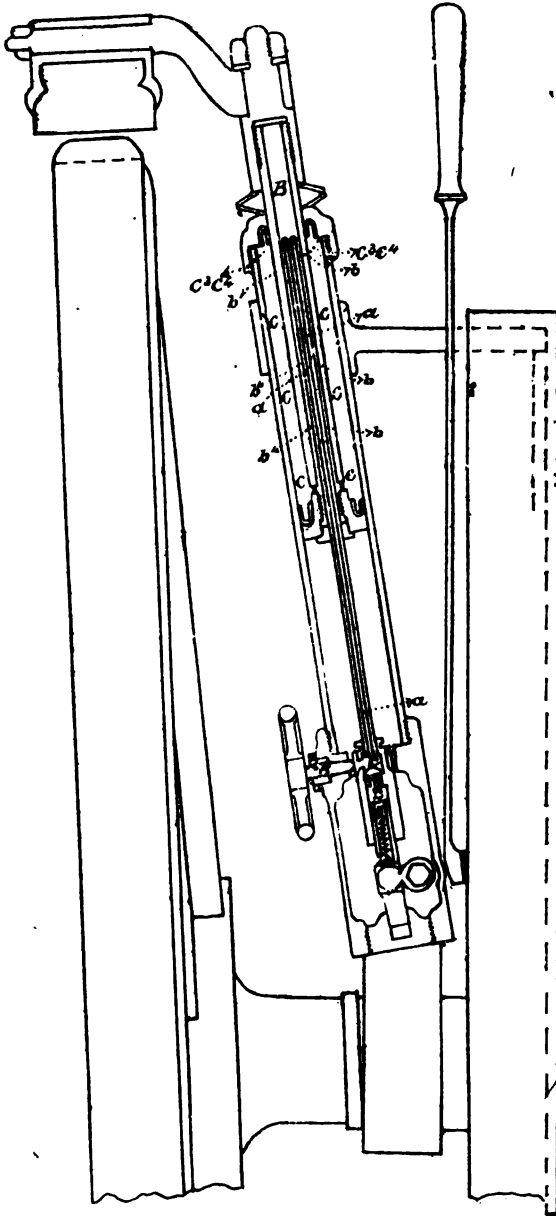
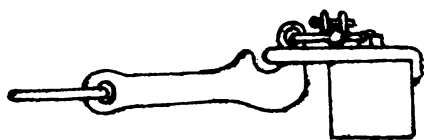


PLATE IV.





SPLINTER BAR ATTACHMENT.

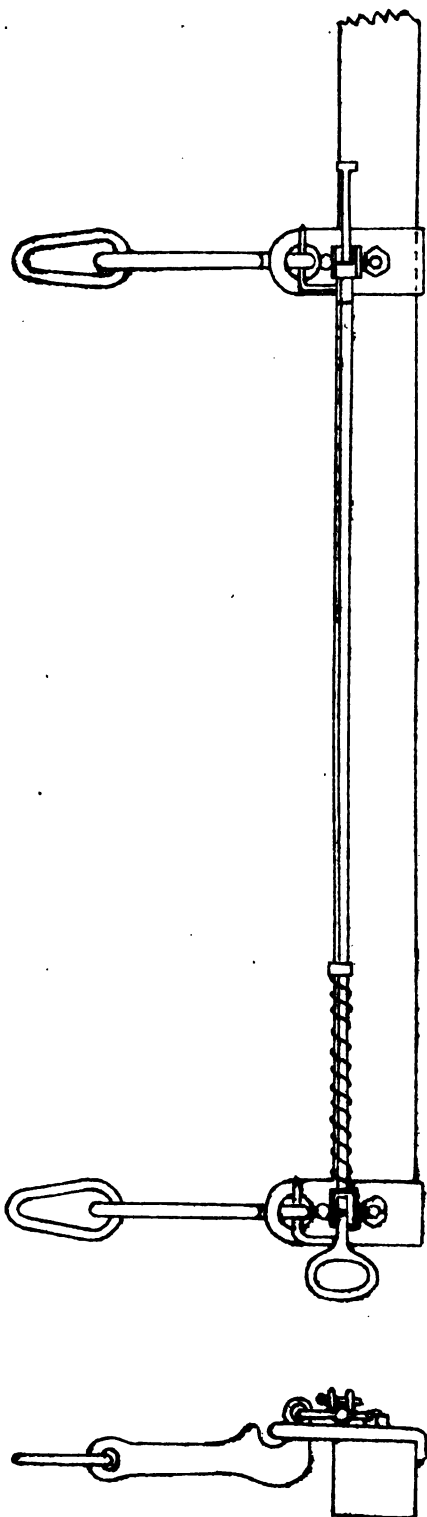
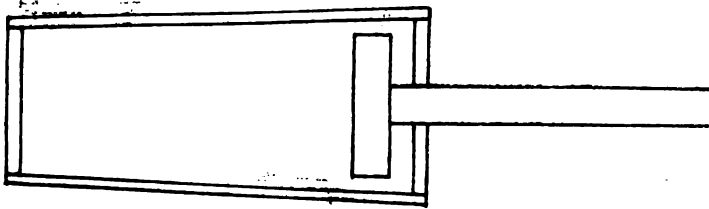
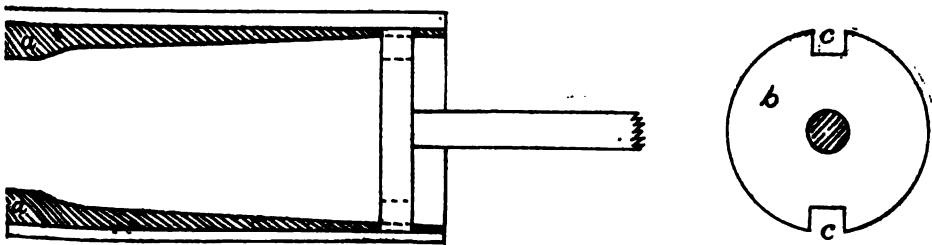


PLATE IV.

TAPERING CYLINDER.

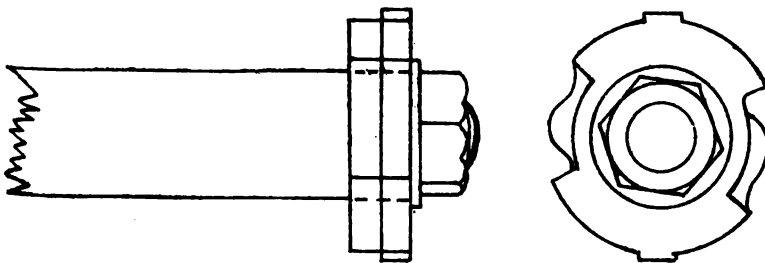


Thickening Strips.

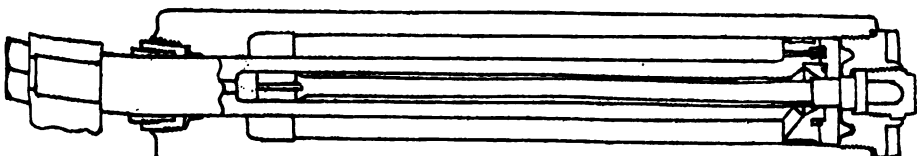


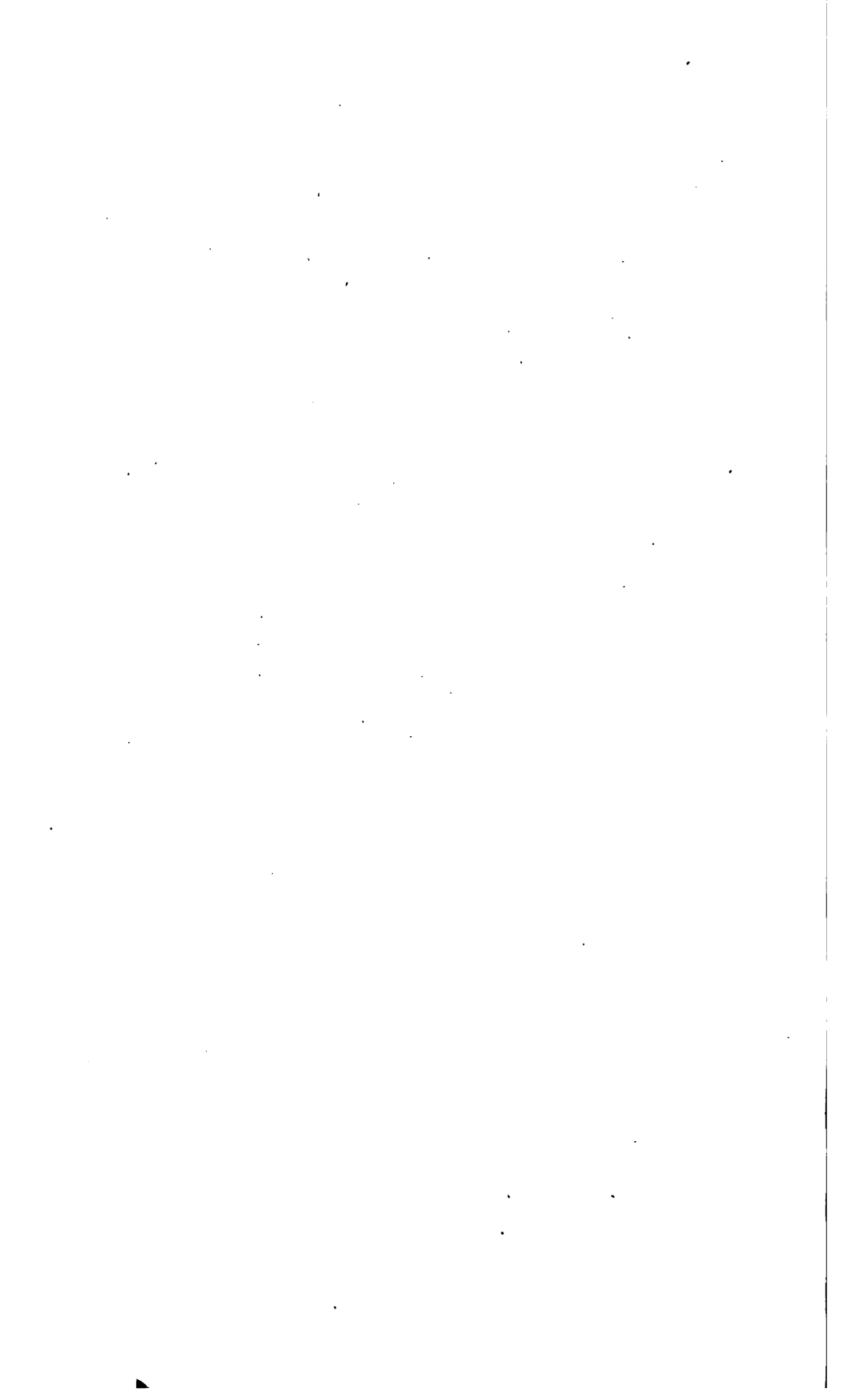
a.a. thickening strips
c.c. ports for ditto

VAVASSEUR PISTON HEAD.

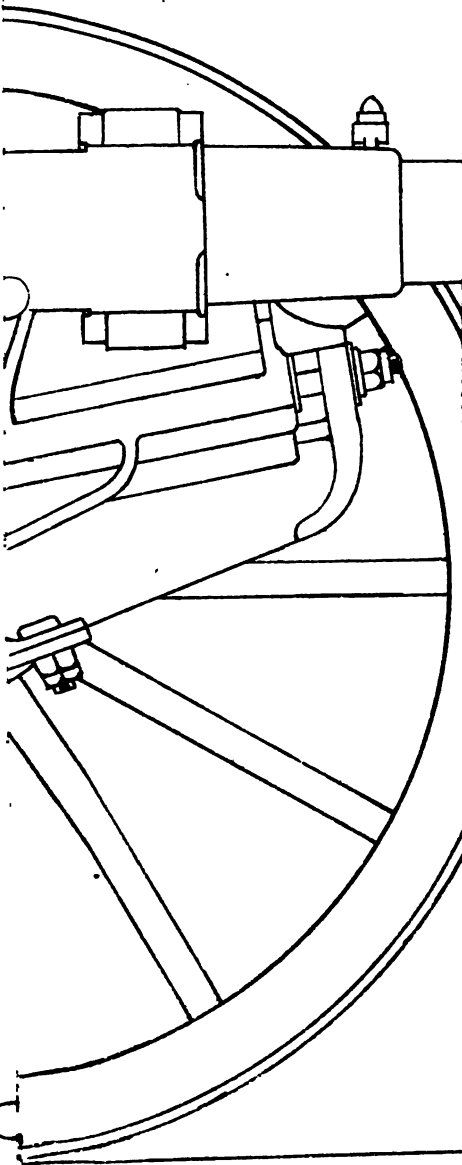


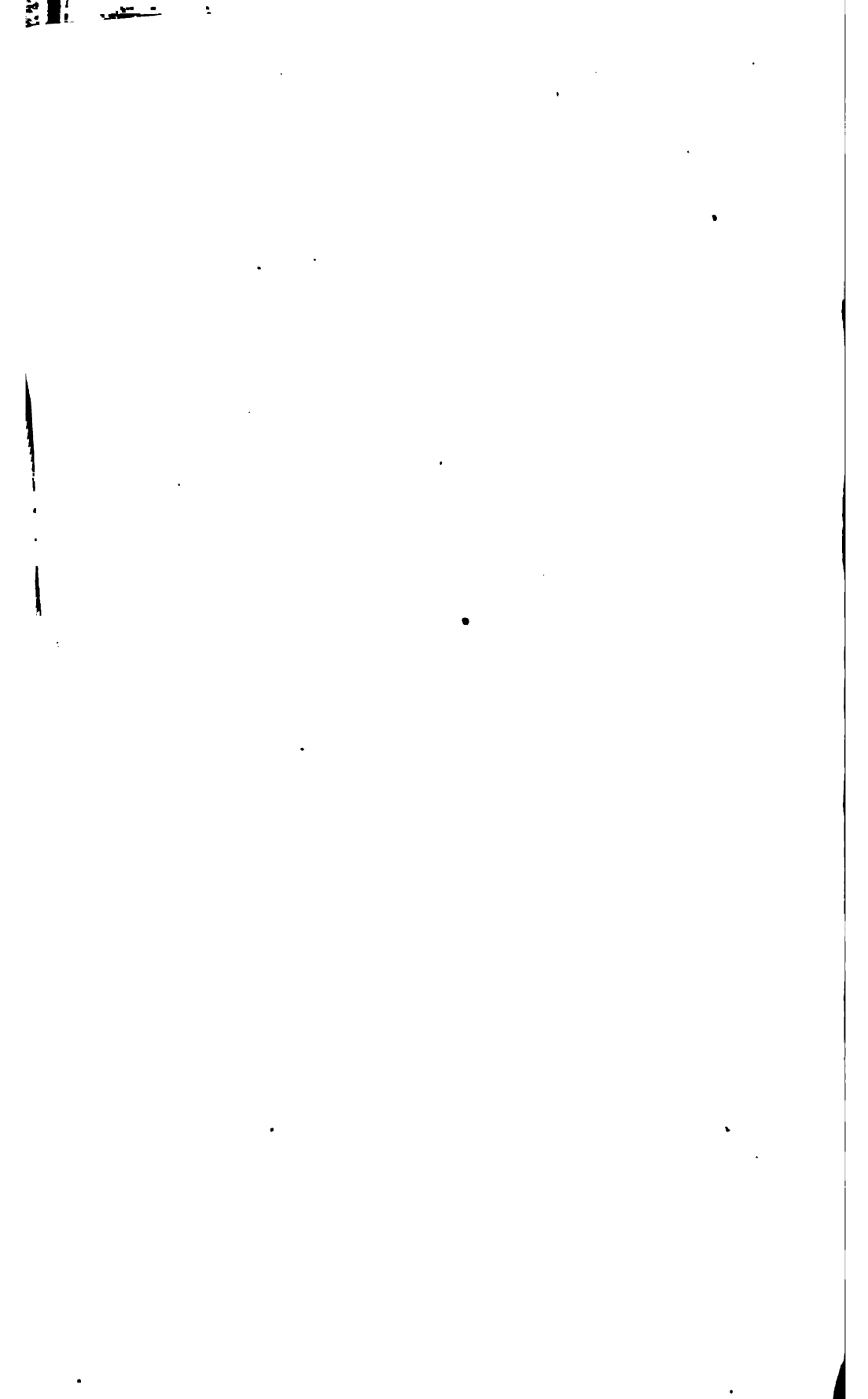
CANET TAPERING CORE.



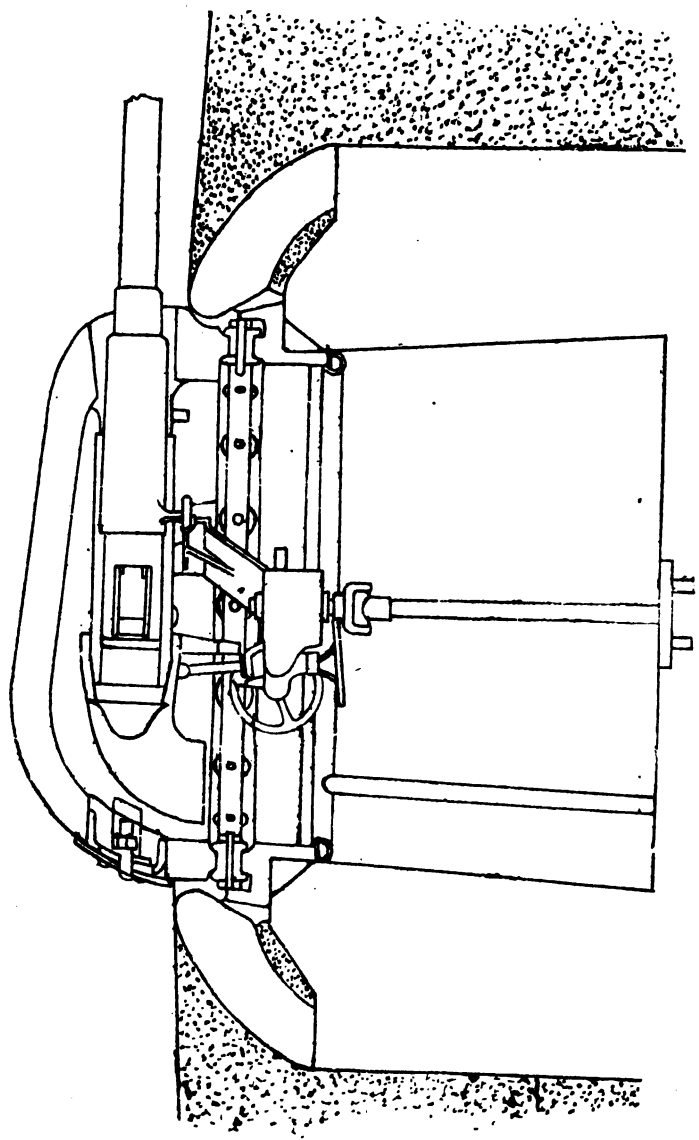


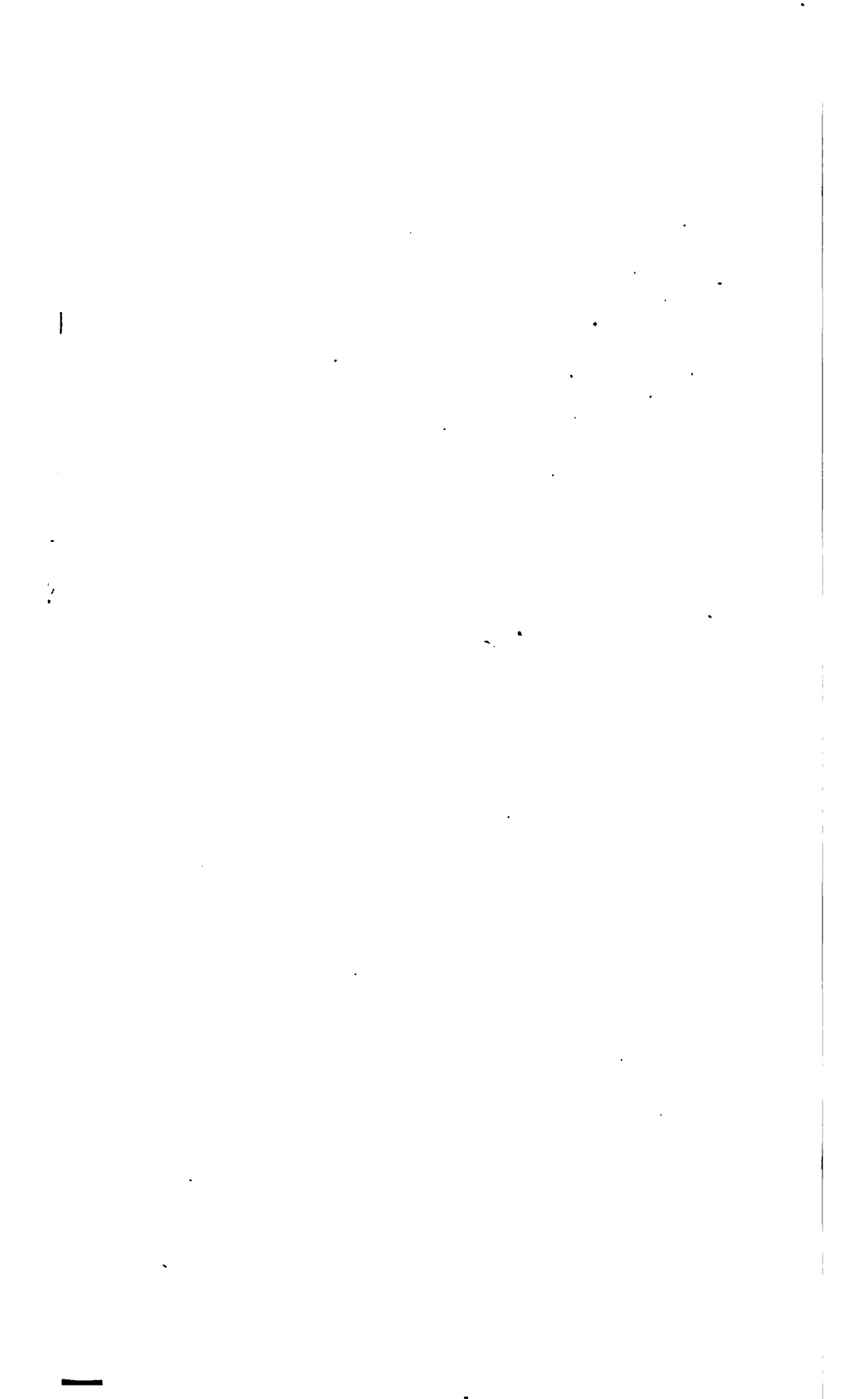
Q. F.





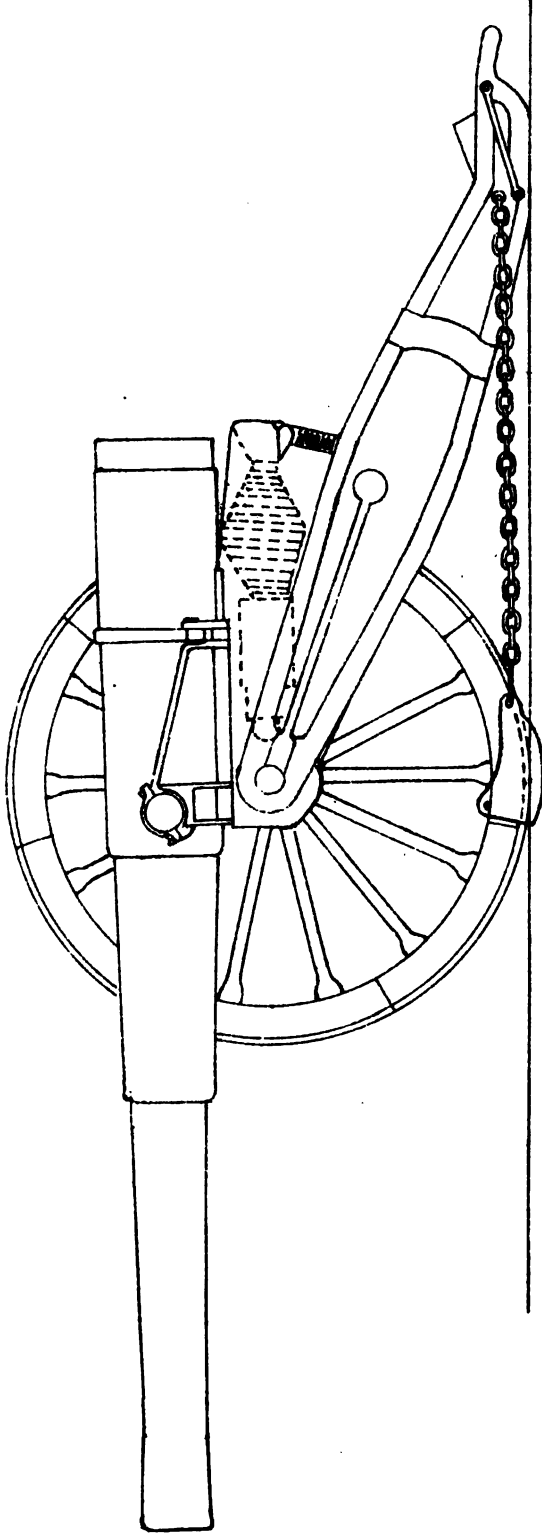
TURRET FOR DEFENCE OF MOUNTAIN PASSES

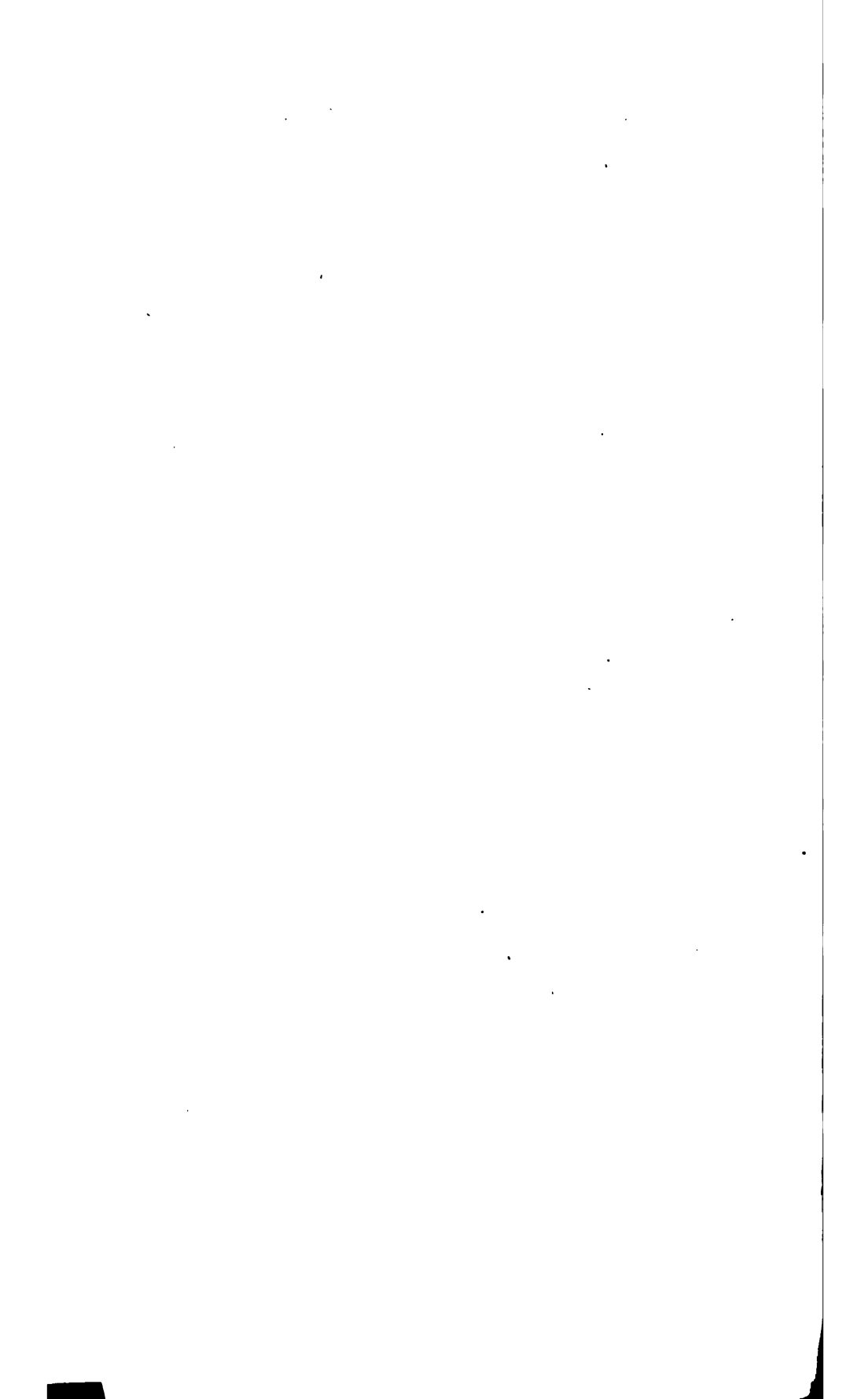




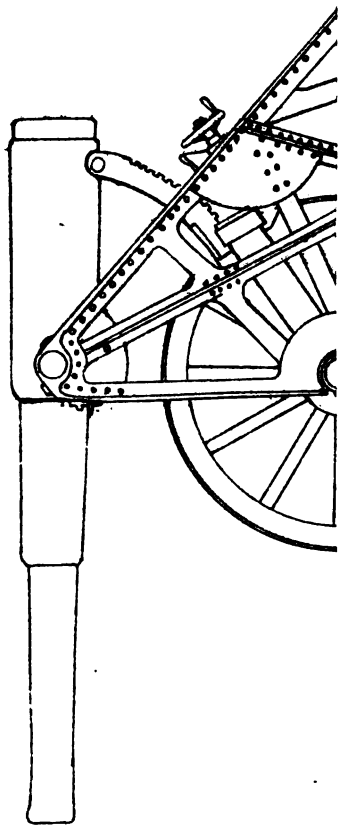
CARRIAGE, B. L. 4 INCH.

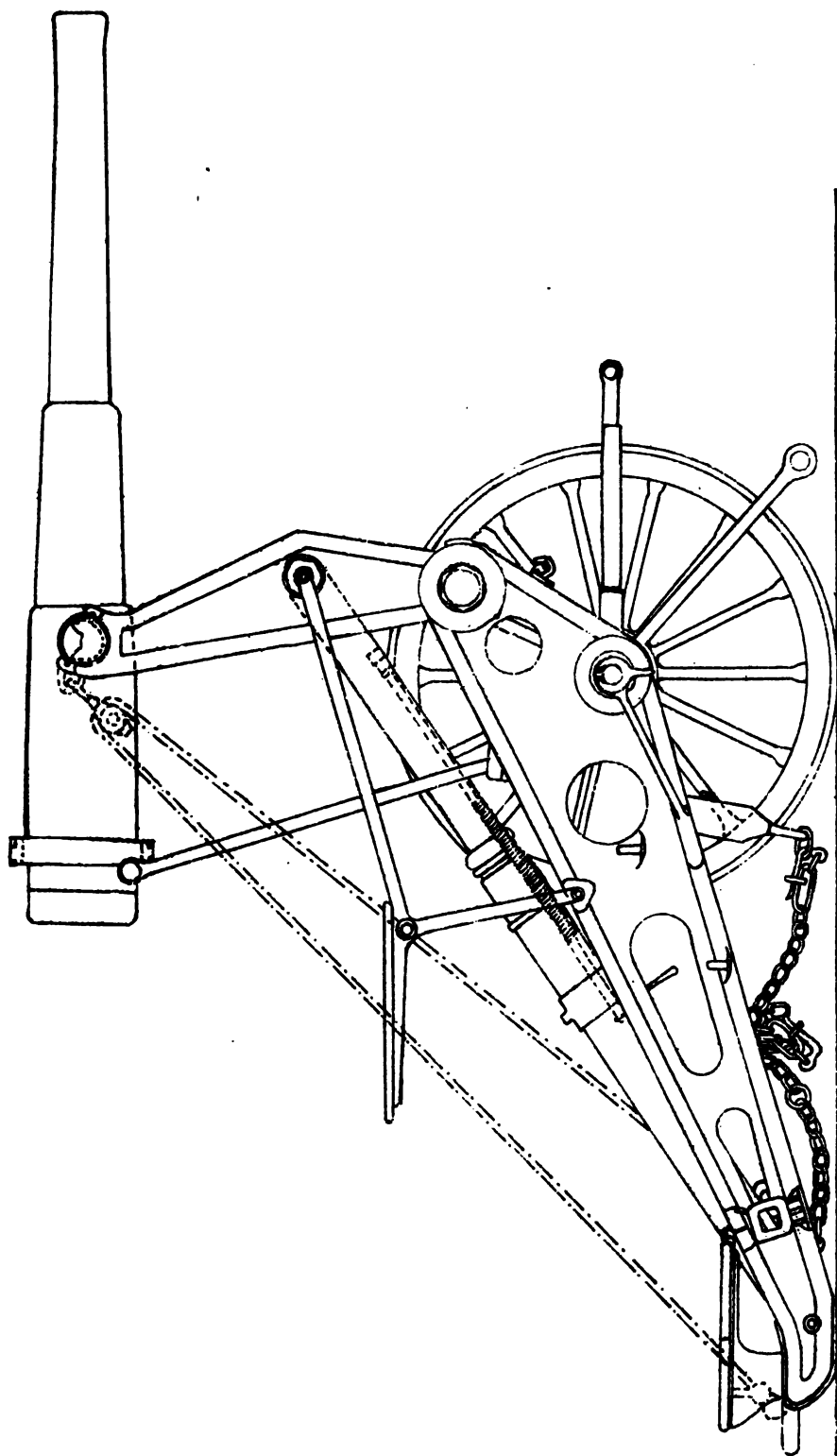
30 PR.





4 INCH LATTICE GIRDER CARRIAGE





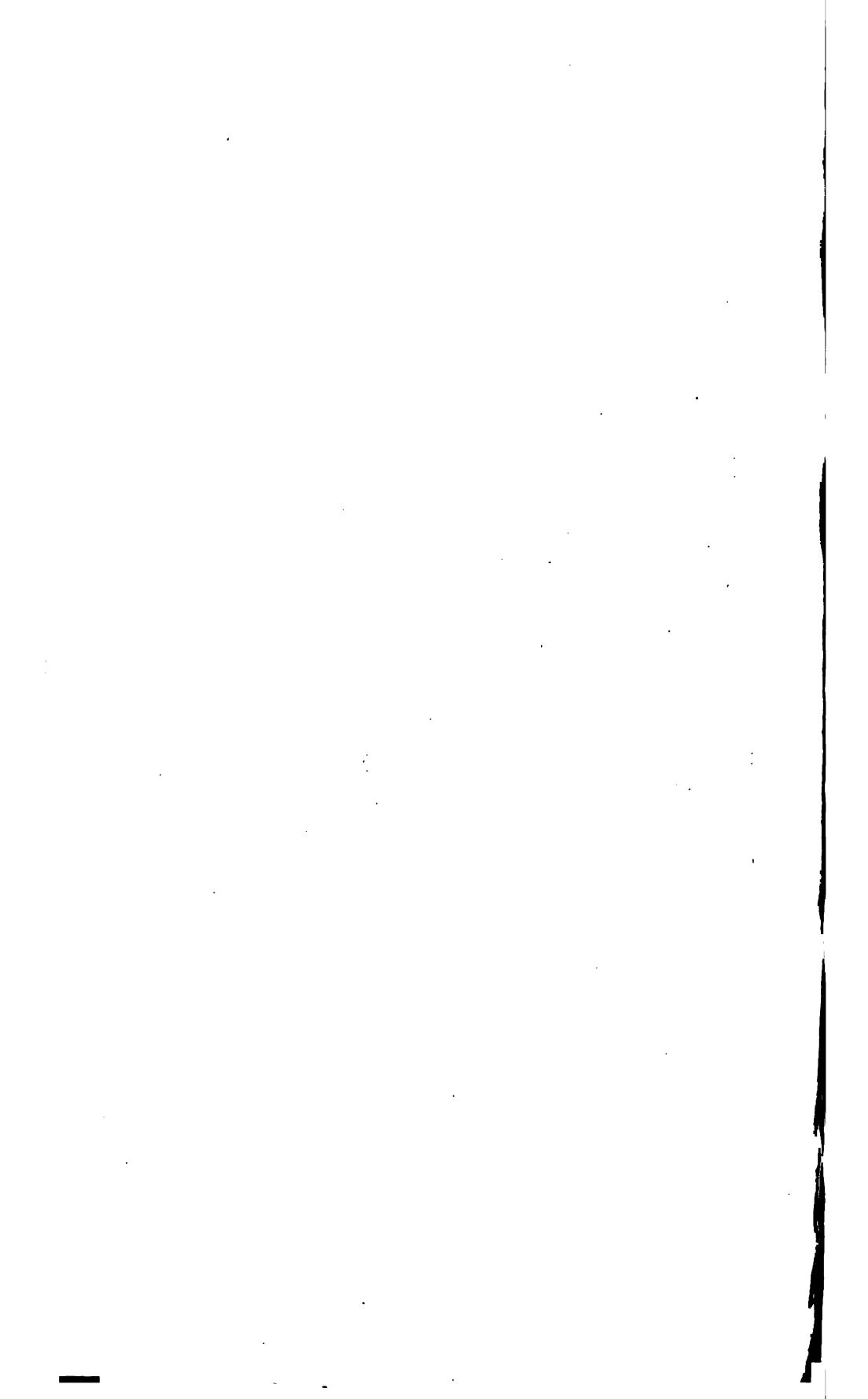
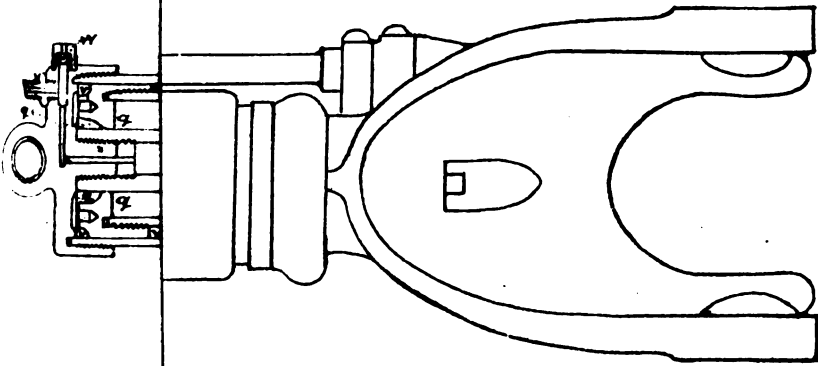
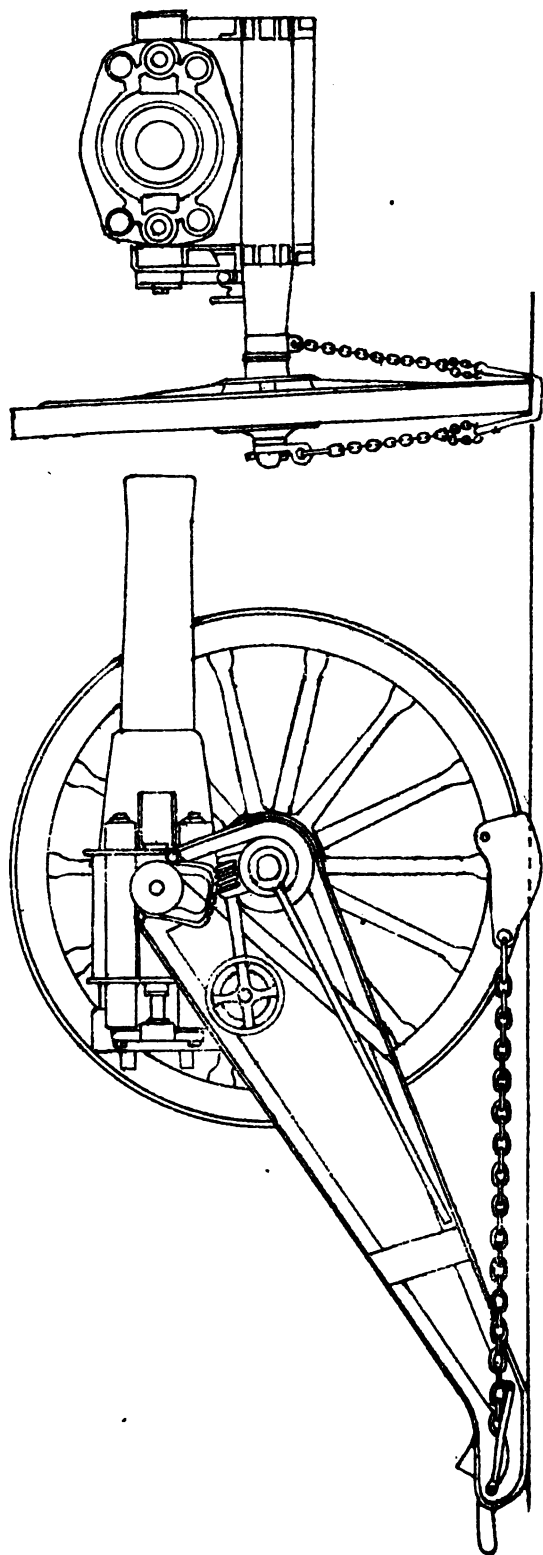
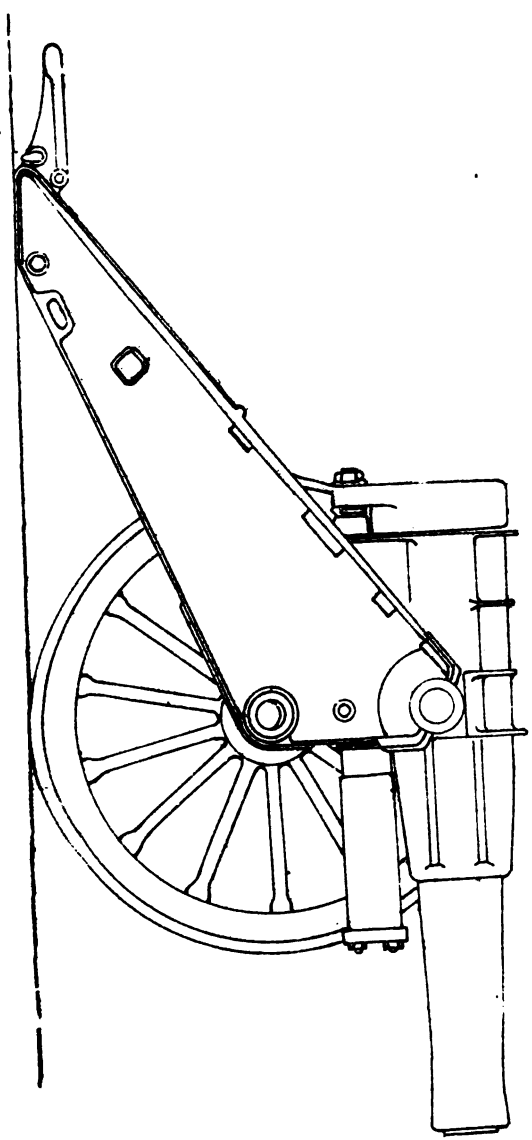


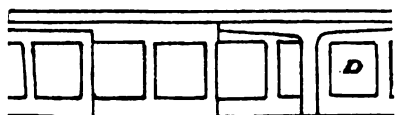
PLATE XI



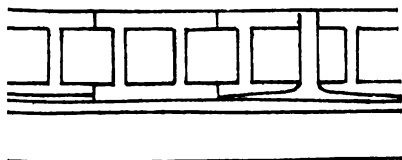


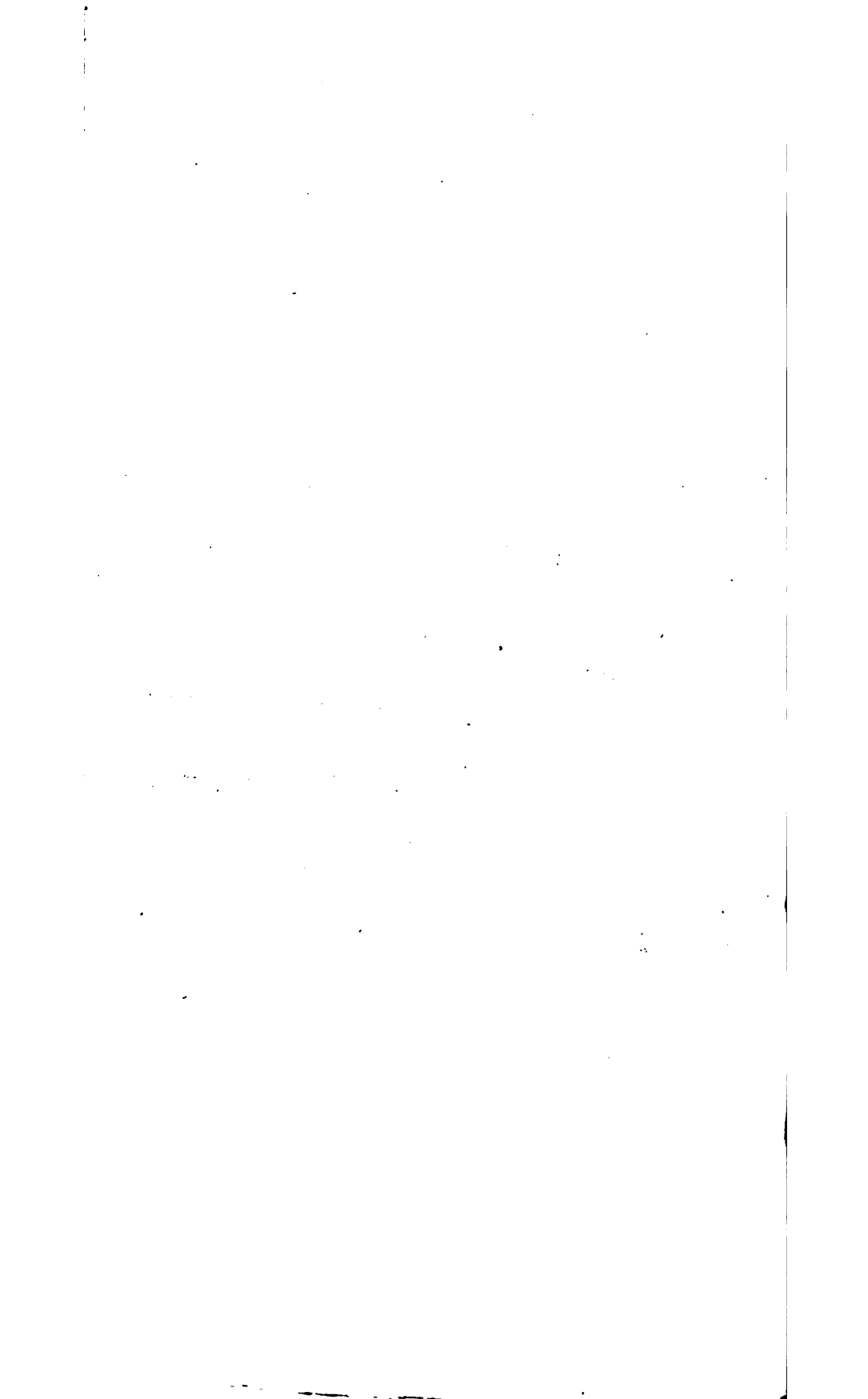
B. L. 6 INCH, HOWITZER.

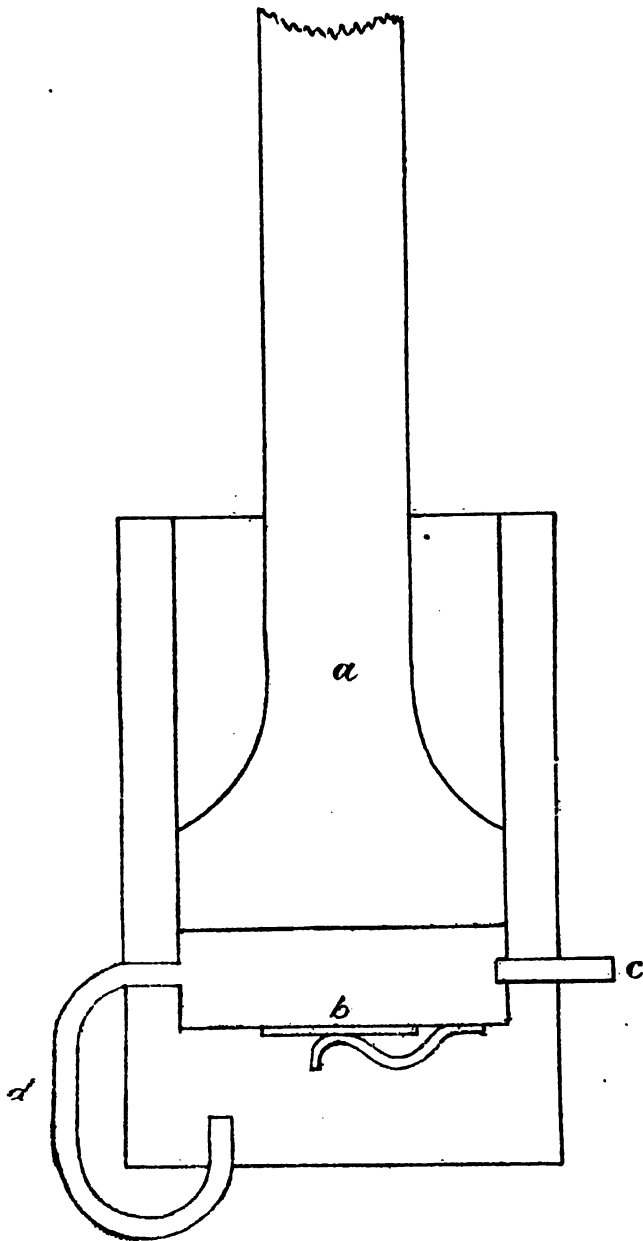




P'







- a. Piston*
- b. Recoil Valve*
- c. Raising Valve*
- d. Lowering Pump*

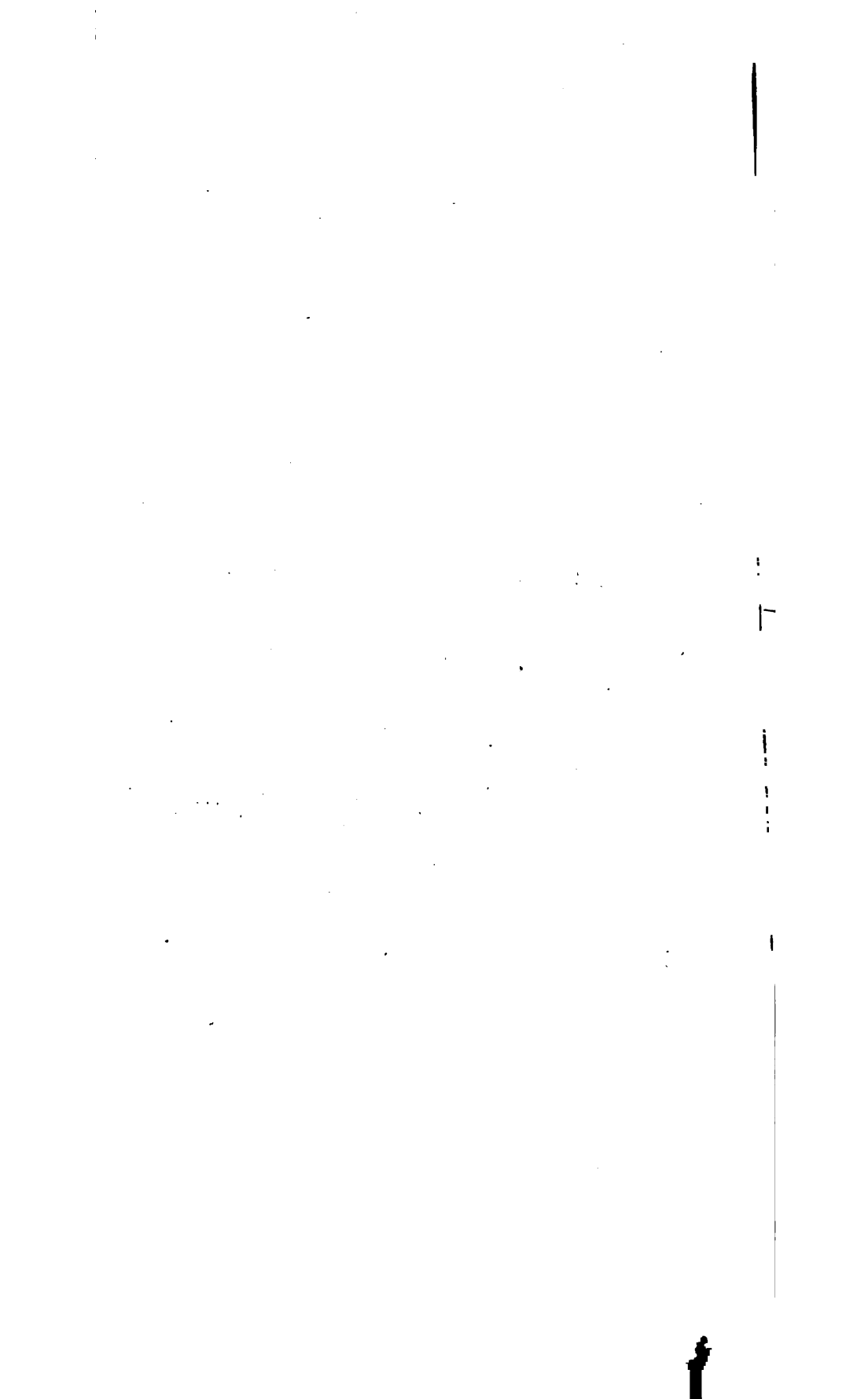
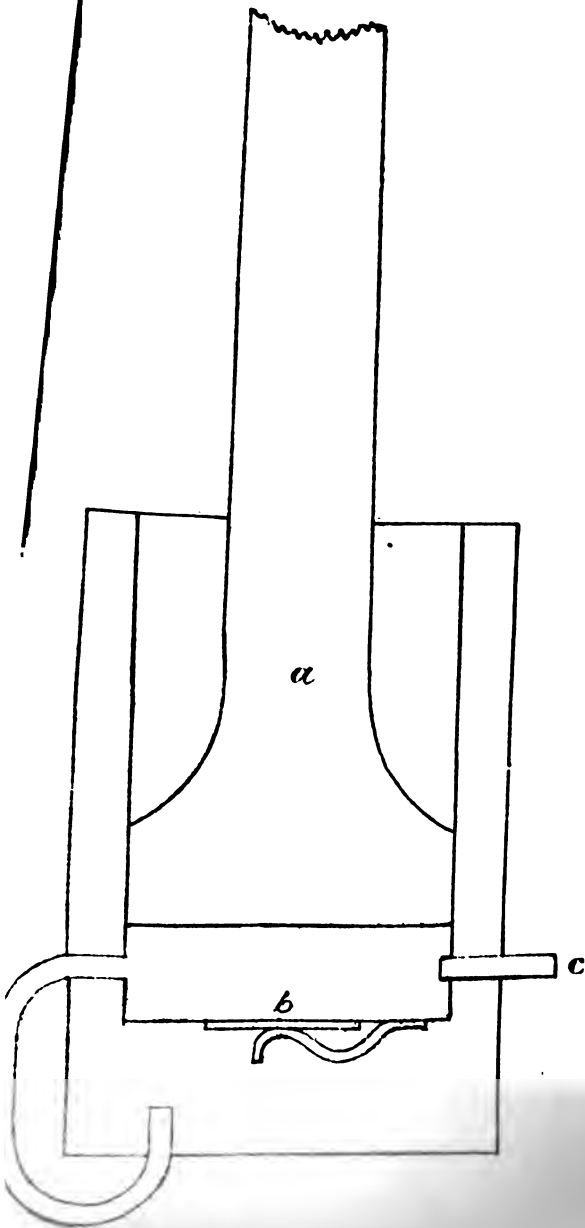
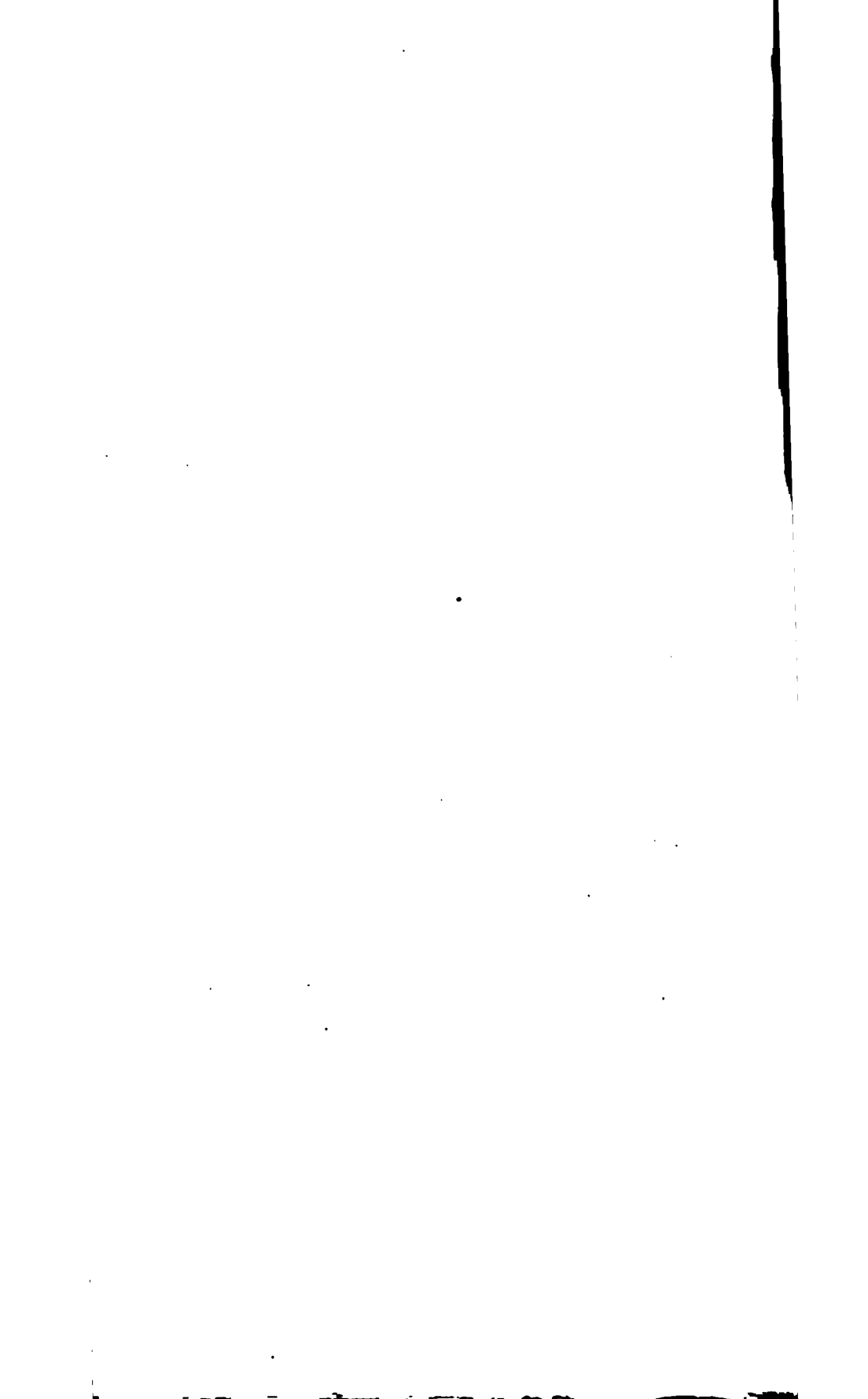
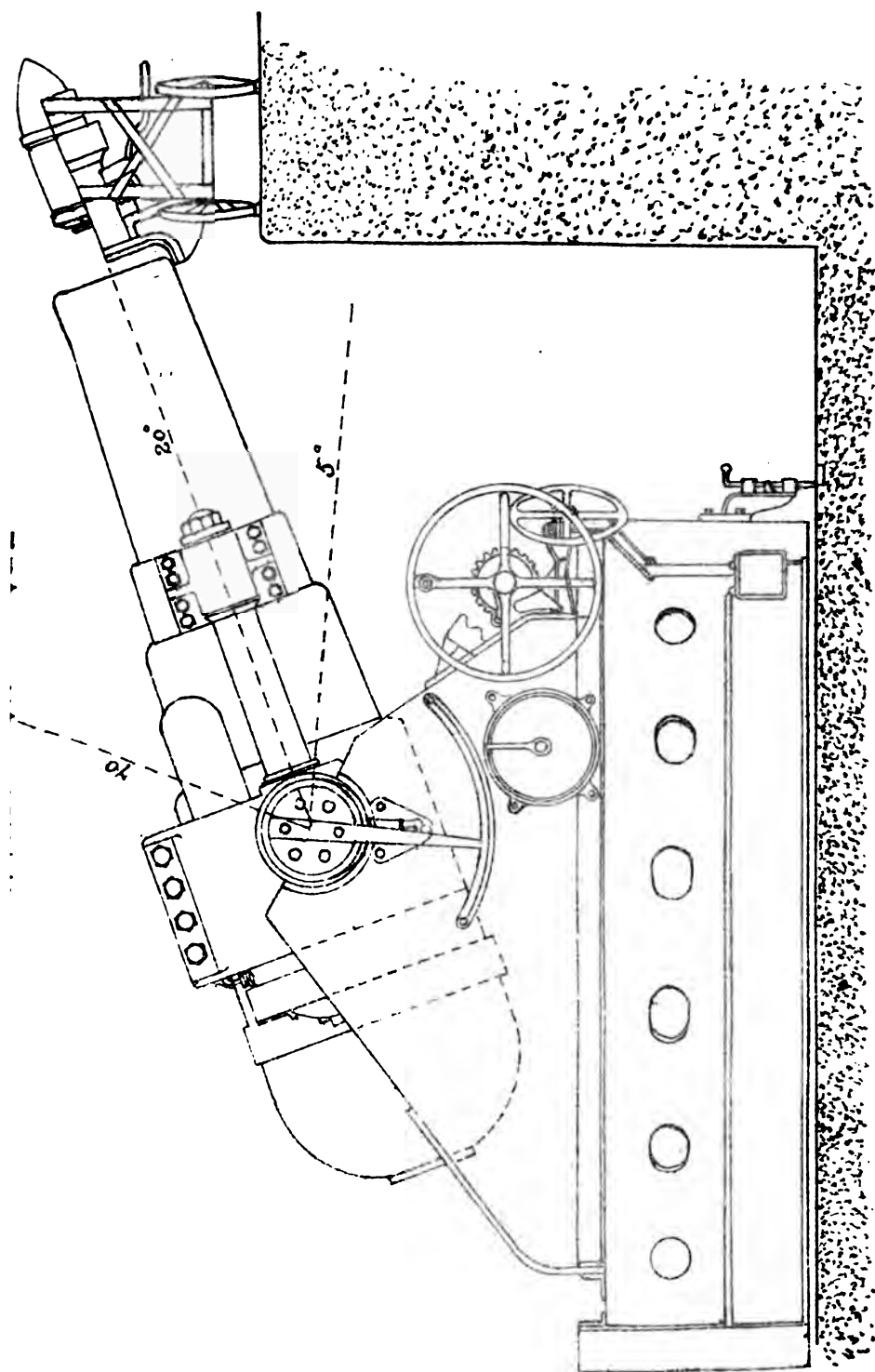


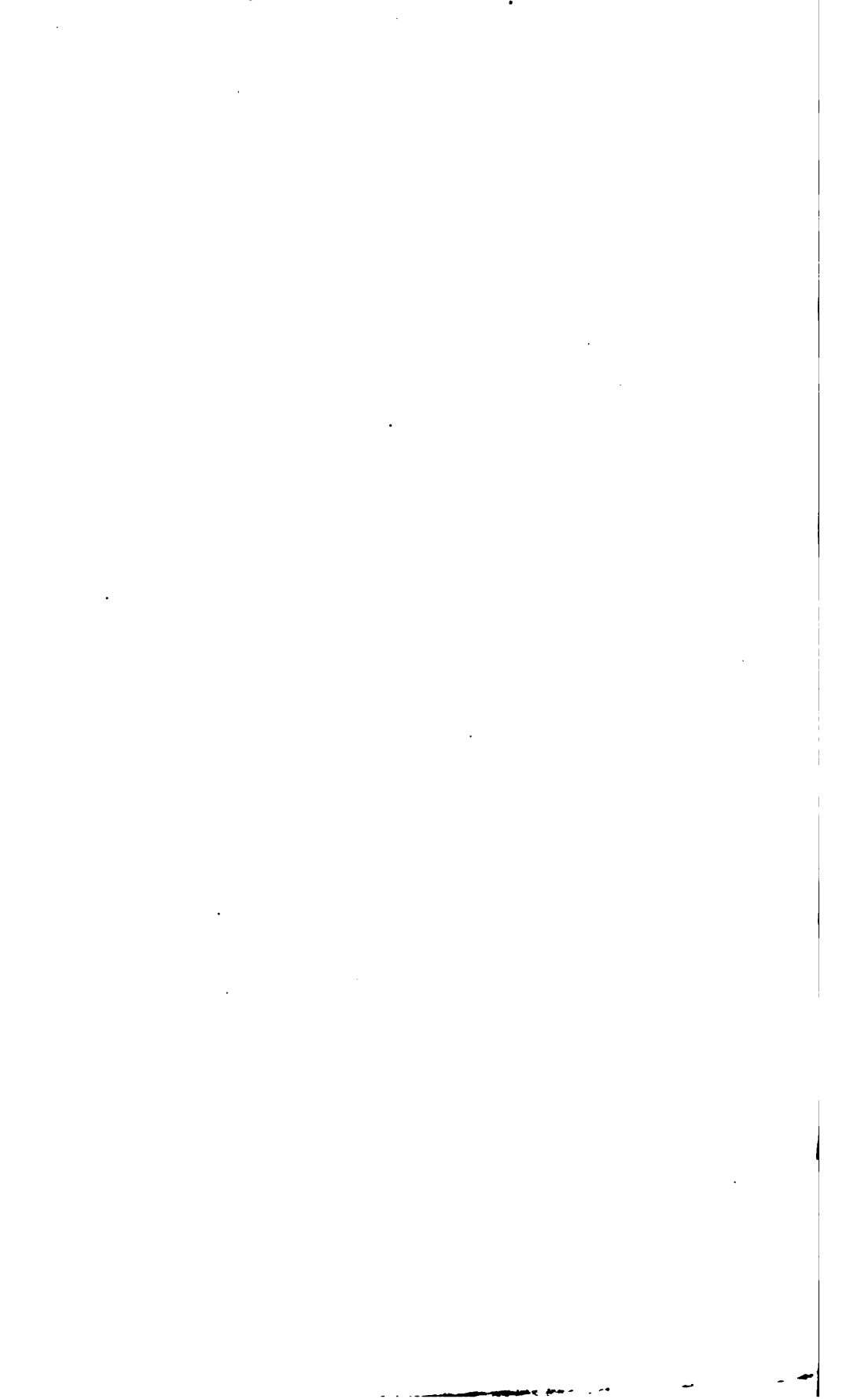
Plate XV.



a. Piston
b. Valve
c. Rod

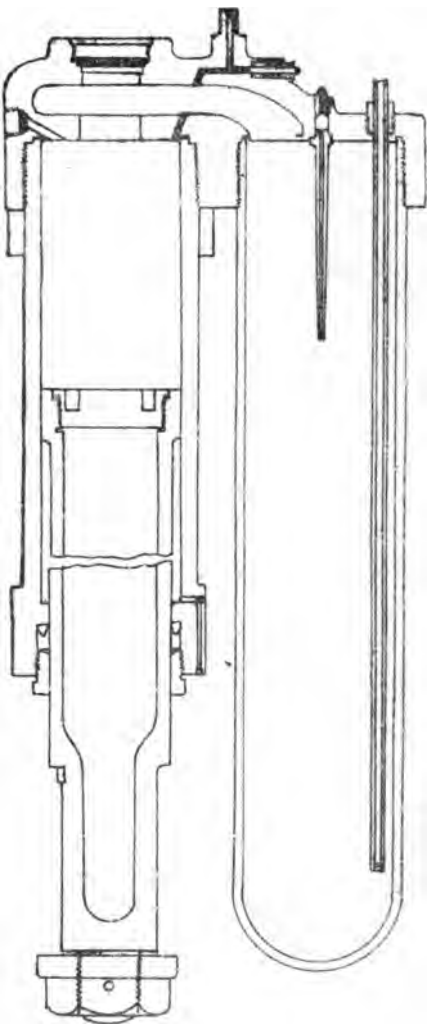


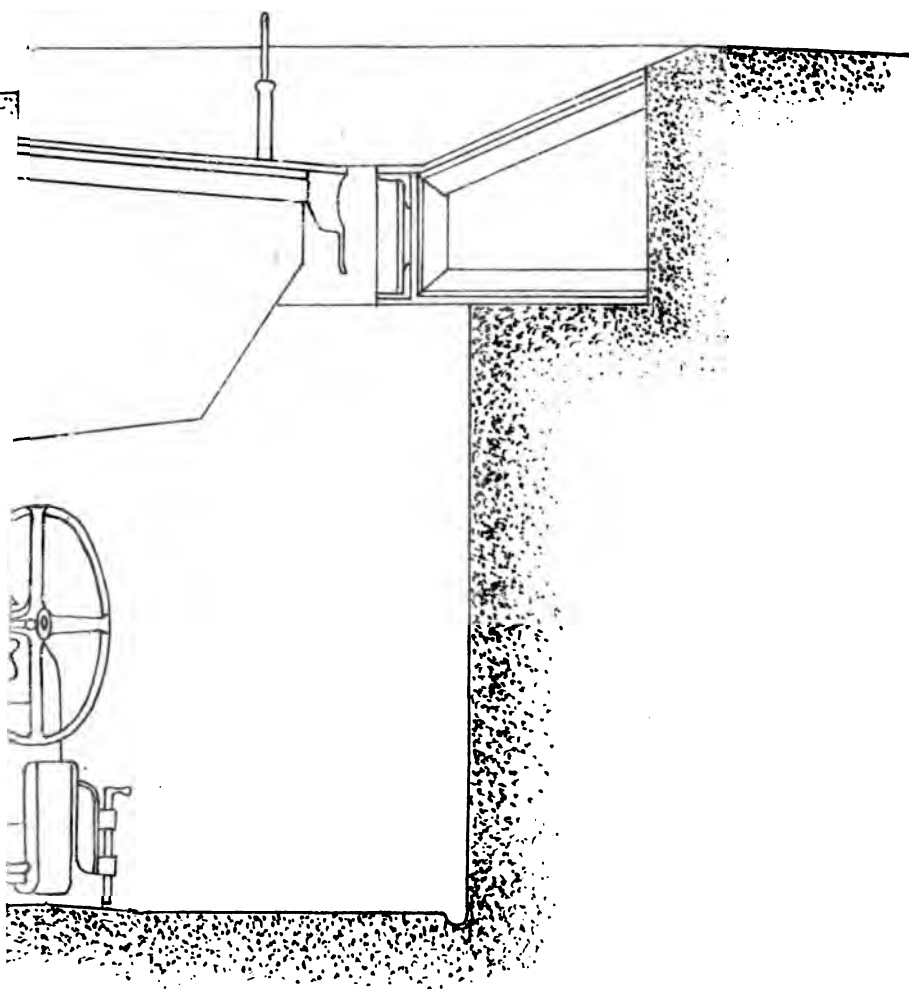
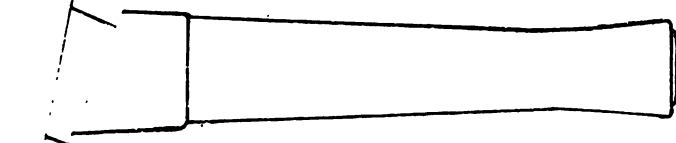


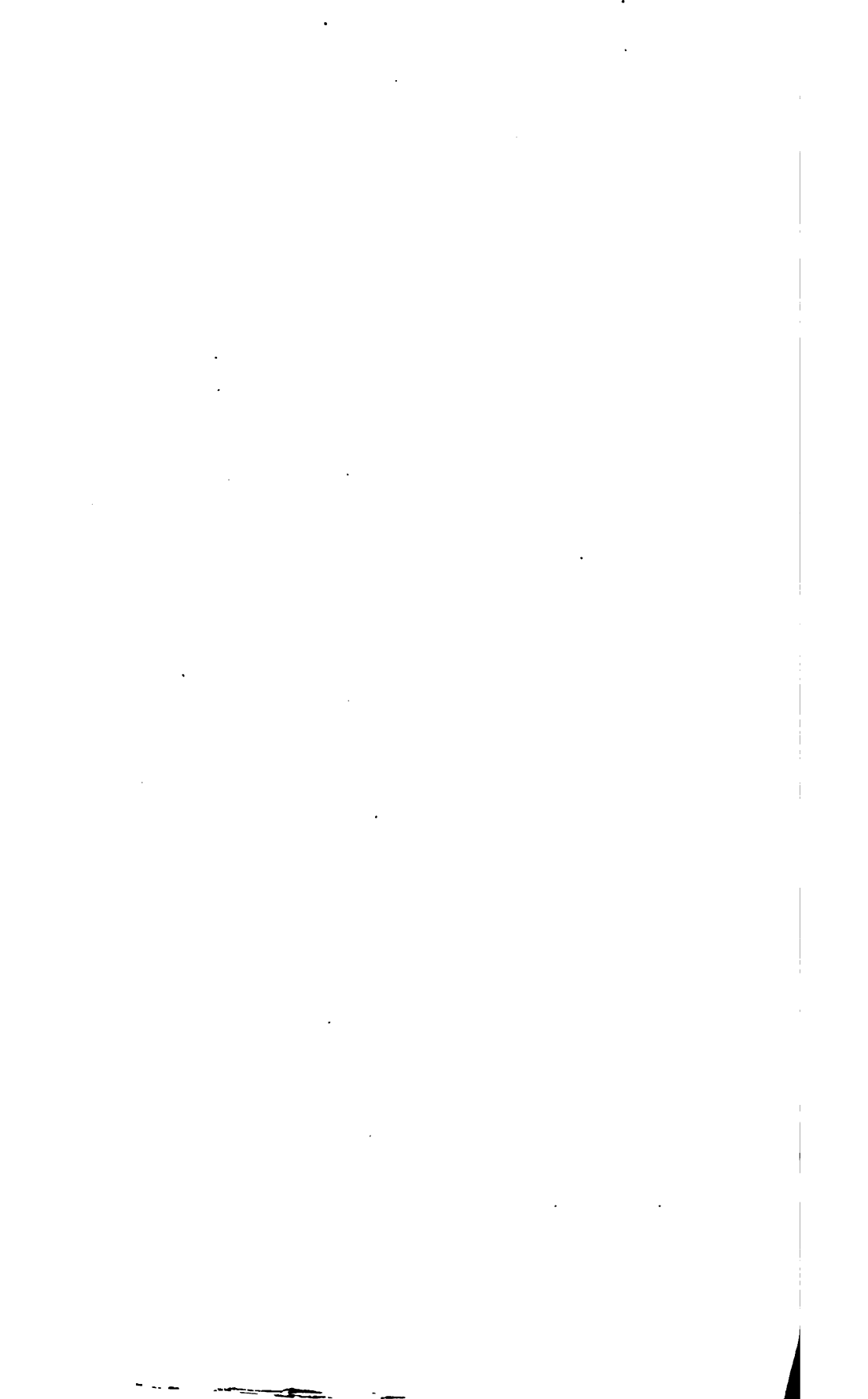


BUFFER R. M. L. 9 INCH.

PLATE XVII.

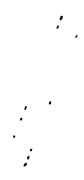
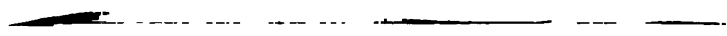




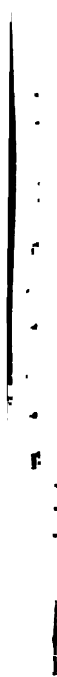
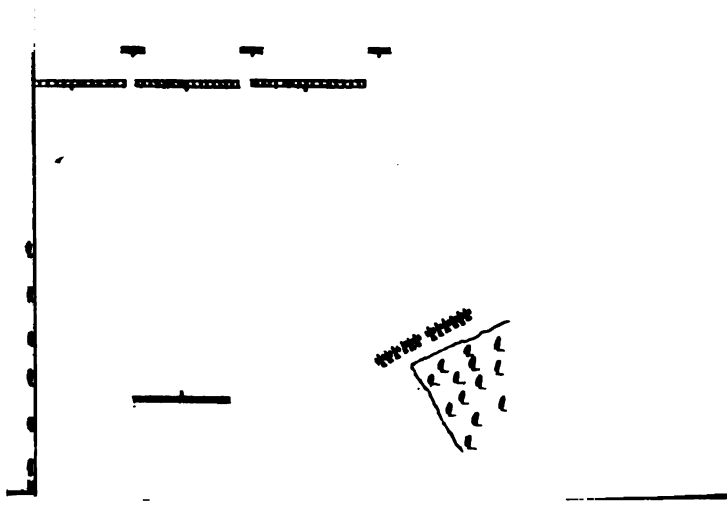


canal

2.2.



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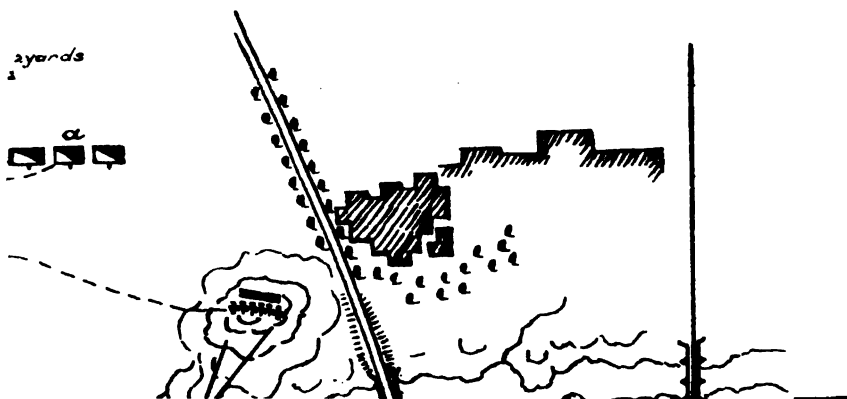
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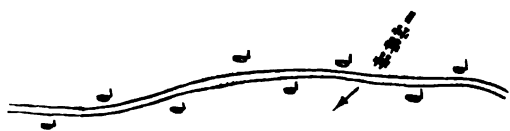
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No. 111.

THE WAR GAME ON THE MODEL.

By Captain H. A. BETHELL, R. A.

There are many objections to the usual method of playing the War Game on three sets of maps. The endless delays caused by the transference of the pieces to the umpires map, the arguments as to whether a move would be possible on the ground, the small scale of the maps, all tend to diminish the interest in the game, especially as regards the bystanders.

When, however, the game is played on a large scale relief model, it is much simplified. There are no delays, no questions as to whether one point can be seen from another, the position of the troops is clearly visible, and the game becomes both instructive and interesting to players and lookers on.

The objections to a relief model as hitherto used are :—

- 1.—The cost is prohibitive.
- 2.—The model being a massive affair running on a tram-way in the floor requires a large room specially assigned to it, which is rarely available.
- 3.—After playing a few games on a model, officers get to know the ground by heart.

I propose to describe a model which can be made for Rs. 200, which can be set up in any room in ten minutes, and the sections of which are interchangeable so that they can be combined in different orders, each combination representing a different piece of country.

A few words may be necessary as to the method of playing the game.

A general idea is issued, and the commanders and staff of each force told off. The troops are placed upon the model in accordance with the idea, and each commander issues his orders and proceeds to move his troops as in actual warfare. "Moves" varying from one hour at the commencement to two minutes at the final stage are ordered. The assistant umpire on each side is responsible that the correct distances, as modified by the nature of the ground, are traversed. Moveable screens prevent the players from seeing further ahead than would be

possible in reality. If reconnoitring parties are allowed to pass these screens, messages are sent back by the umpire giving such information as they might be expected to obtain, and so the game proceeds until the opposing forces come into collision, when the verdict of the umpire decides the fate of the day.

Construction of the Model.

The model in use at Karachi, like the one now being built here, (Secunderabad), is on a scale of 100 yards to an inch (about 18 inches to the mile) the vertical scale being 100 feet to an inch. It consists of 24 sections each 6 feet by 2 feet 6, and measures altogether 20 feet by 18, or about 14 miles by 12. For any special idea the scale can be assumed at 12 or 6 inches to the mile, thus increasing the distances.

The left portion of the model is open and adapted for cavalry work, the centre is close country, and the right affords good artillery positions. The sections are supported on long trestles at the height of an ordinary table, and can be arranged in 8 different orders, or, by introducing an extra section, in 32 different orders. Each section consists of a shell of papier-maché mounted on a light wooden frame, and is painted to represent a country, while small model trees, houses, bridges &c., add to the effect. The troops are small blocks of wood or lead made to scale and painted red and blue.

The first step towards building the model is drawing the map.

If in Fig 1, the slips AC., DF., &c., be cut apart horizontally, it will be found that they can be fitted together in the following orders:—ADGJMPSV, DGAJMPSV, ADMPGJSV, ADGJMVPS, ADMVPGJS, and DMVPGAJS. If another slip fitting *a a* be introduced, 18 combinations will be possible, and so on. Maps of this kind are easily designed if it be borne in mind that while the edges *a a*, *b b*, and *c c*, must be similar, the interior of the sections may vary to any extent. The roads are easily made to fit, but it requires some ingenuity, to prevent the rivers from running uphill.

The map being completed, profiles are next constructed of the four edges of each section, and handed over to the carpenters to cut out. 1 inch deal or $\frac{3}{4}$ inch teak may be used, the larger pieces being framed together as shewn in Fig 2, for lightness' sake. If a hand saw is available all the *a's*, *b's* and *c's* can be cut out together, thus saving labour. It is convenient to mark the roads and rivers by notches in the edge of each piece. This being done the four pieces forming each section are fitted together, taking care that the external measurements (6 feet by 2 feet 6 inches) are accurate, and strengthened by corner pieces. The paper is then applied as follows:—

Place the complete section on the floor, and fill it with dry moorum or sand, shape the surface of the sand with a trowel to correspond with the contoured map. On top of the sand spread $\frac{1}{2}$ inch of clay, smooth it off with water, and leave it to dry. The following compositions are now prepared:—

1.—Papier-maché.

Take a lot of old paper, wash and soak it for two days. Mash it thoroughly in a big mortar. (At Secunderabad this was done in the

military prison.) Dry until only a few drops of water can be squeezed from a handful. For one section, take a medium sized bucket full of this. Put it in a wooden tub, and stir into it 2 lbs. coarse country gum dissolved in one quart hot water, 4 lbs. lime in powder, and 1 oz. sulphate of copper dissolved in water. Let a coolie dance a double shuffle in it for half a hour, when it should be well mixed.

2.—Cement.

Dissolve 1 lb. country gum and 2 lbs. coarse flour in water, and stir together till free from lumps, add $\frac{1}{2}$ oz. sulphate of copper.

The clay mould being now dry, is trimmed till it is half an inch below the wood, (Fig 3.) Take a piece of coarse native cloth, and stretch it over the clay, nailing the edges to the inside of the wooden frames. Half of the nail heads should be left projecting to give a hold for the paper. Brush the cloth over with cement (No. 2) avoiding the nail heads. Spread the papier-maché evenly over the cloth, and beat it with the hands till consolidated. Take care to press it well into the corners. Leave the paper at the edges $\frac{1}{4}$ inch, higher than the wood. Next day roll it with a 6 lbs, round shot. This must be run backwards and forwards till the whole surface is evenly marked, and the paper at the edges is squeezed down level with the wood. Leave it for two days, brush it over with cement, and stretch a piece of native cloth (finer than that used for the underside) over it. If the cloth will not stick in the hollows, a bucket full of damp sand will keep it down. The cloth is well cemented down over the wooden frames, and secured with a few tacks.

When thoroughly dry, the cloth may be sized and painted. The wood-work should not be painted. See that the linseed oil is of good quality, or the model will stick to the hands of the players when finished. One coat of reddish brown paint is sufficient. When this is dry, the frame and paper are lifted off from the clay mould, and the back painted. As the paper has a tendency to buckle in drying and draw in the wooden frames, two stretchers (Fig 4) to each section should be fitted, taking care that the exact width of 2 feet 6 inches is maintained. The surplus cloth is then trimmed off with a sharp chisel.

When finished the papier-maché should be as hard and resonant as wood. If the original mashing and the rolling have been thoroughly done, it should bear the weight of a man. No anxiety need be felt about the failure of this part of the process. My experience is that even with bad work the paper crust is quite strong enough for the purpose. The sections when dry are fitted together and any gaps between them are closed by nailing thin pieces of wood or numnah to the edges. They are now ready for the final painting and decoration. This part of the work must be done by an officer, and requires taste and an eye for colour. The prevailing tint should of course be green, and the brown will be found an excellent ground to work on. Fields, hedges, roads, rivers &c. are indicated as in military sketching. By rubbing a nearly dry brush over the cloth a very good effect of grass may be produced. Churches, public houses, bridges and houses are cemented on with cement No. 2, mixed thick, and each is further secured by a small nail

(Fig 5.) Houses are made by planing a stick to the required section and sawing off small pieces. Trees are made of brass wire and lamp-wick or worsted dyed of different shades.

The accessories required are a clock-face, two or three curtains hung across between moveable standards, some measuring triangles for 2 and 5 minute moves, a 6 foot measuring rod, a piece of chalk, some cotton wool to represent smoke, and a set of troops.

Eight trestles ten feet long (Fig 6) are used to support the model, or benches, if available, answer the same purpose.

A final coat of copal varnish is given, the trees are planted, the names painted in, and the model may be considered finished.

REPORT ON SWIMMING INSTRUCTION,
AS CARRIED OUT BY THE 9TH BENGAL LANCERS.

Communicated by the Adjutant General in India.

A course of swimming instruction was carried out by the 9th Bengal Lancers in May and June last. The final practices were witnessed by the General Officer Commanding the Peshawar District who was much struck by the confidence displayed both by men and horses.

There was no hesitation on the part of the horses in entering the water; many of them galloped in, and appeared to enjoy the swim as much as the men, who evinced the greatest keenness and interest.

The Kabul river, at the place selected, was about one hundred yards wide, with a current flowing at a velocity estimated at a little more than four miles an hour. No horse was carried down stream much more than a hundred yards.

The experiment was carried out as follows:—

Each squadron having been drawn up on the bank, the men were ordered to—

Dismount.	Unload boats.
Undress.	Dress.
Unsaddle.	Saddle.
Pack saddles and kits in blankets.	Mount.
Load kits in boats.	Advance about 100 yards.
Mount.	Dismount.
Advance and swim river.	Fire a volley.

The average time occupied by each squadron from the order “Dismount” till the first volley was fired was, as nearly as possible, 20 minutes. The few non-swimmers among the men crossed in boats with the kits; their horses being led across by some of the best swimmers, who had no difficulty in managing two horses. The rafts designed by Captains Peyton and Angelo were in the first instance taken across by the men. On the return journey the experiment was tried of making horses tow them and this proved most successful.

A number of horses were also turned loose and driven across: they crossed without the least hesitation, rejoining their companions on the opposite bank.

Major Money, commanding 9th Bengal Lancers, found on the first day that his own charger and many other horses were most unwilling to trust themselves in deep water, but they rapidly gained confidence.

The great success of the experiments shows the necessity for careful training; and also how little training is required. Three days'

practice would appear to be sufficient: without any practice, it is doubtful if any regiment would be able to cross a river without very great delay, or without casualties.

The following is Major Money's report on the system of imparting instruction:—

"The spot which I myself selected with Captain Peyton, is situated about nine miles from the lines of the regiment, and is a most suitable one for the purpose required. With the help of two boats kindly lent by the Executive Engineer, Public Works Department, one of which was kept in the middle of and some way down stream, and whereon two of the best swimmers were invariably posted, ready to assist any man in difficulty, the danger of any one being drowned was reduced to a minimum. I am glad to be able to report that the whole of the practice was completed without a casualty of any kind.

The first squadron was instructed by Captain A. G. Peyton, the squadron commander. Owing to so many officers being absent at different classes, and in order to finish the swimming of the whole regiment during the most favourable season of the year, and before the 2nd leave and furlough men went away, I divided the remaining six troops into two parties. The first of which, consisting of the 3rd, 4th and 5th troops, was instructed by Captain F. W. P. Angelo, and the second, consisting of the 6th, 7th and 8th troops, by myself. Reports of the two above-named officers follow.

With regard to the instruction of the 6th, 7th and 8th troops, it was carried out in a similar manner to that described by Captains Peyton and Angelo. A statement showing the number in each class of swimmers in the above three troops is attached.

Two horses in the whole regiment were found to be quite unable to swim. The horses which were not good swimmers have since been instructed.

The rafts, as described by Captains Peyton and Angelo, made up of lances, mussucks and leading ropes, all of which articles would be available with each squadron on active service, would, in the absence of wood, answer the purpose perfectly, and there would be no difficulty whatever in crossing any river. An experiment was made of making horses tow the rafts across, and was found to answer admirably. On service this would save the good swimmers, who, as a rule, are the best men, for it is very tiring to pull or push these rafts when swimming. Two horses were attached with ropes to each raft. This, of course, would only be necessary in the event of a broad river, otherwise men on land could pull the rafts to and fro.

Every man and every horse present, with the exception of recruits and young horses, has now undergone a course of instruction."

9TH BENGAL LANCERS.

Statement showing numbers of swimmers in each class in the 6th, 7th and 8th Troops of the above corps.

Troops.	MEN.						HORSES.			REMARKS.
	NATIVE OFFICERS.			NON-COMMISSIONED OFFICERS AND MEN.			Good Swimmer.	Indiffer-ent.	Non-Swimmer.	
				Good Swimmer.	Indiffer-ent.	Non-Swimmer.				
	Good Swimmer.	Indiffer-ent.	Non-Swimmer.				Good Swimmer.	Indiffer-ent.	Non-Swimmer.	
6th ...	1	...	...	41	5	3	51	2	...	
7th ...	...	...	2	27	2	5	50	3	...	
8th ...	1	...	...	28	...	6	47	3	1	
TOTAL...	2	...	2	96	7	14	148	8	1	

Peshawar, 15th June 1893.

REPORT ON SWIMMING INSTRUCTION BY CAPTAINS PREYTON AND ANGELO.

Orders having been received for the men and horses of the regiment to be instructed in swimming a river, the 1st squadron was told off for that duty and went through the following course:—

Monday, May 1st, 1893.—On Monday, May 1st, the squadron paraded in Hindustani clothes at the tank in the 9th B. L. lines, and the men were examined to test their swimming capabilities. They were divided into three classes,—

- (1) Those who could swim well.
- (2) Those who could swim a little.
- (3) Those who were unable to swim.

Of the 1st Troop, out of 40 native officers, non-commissioned officers, and men present, there were of—

Men who could swim well	28
Men who could swim a little	6
Men unable to swim	6
	<hr/>
	40

Of the 2nd Troop—

Men who could swim well	32
Men who could swim a little	5
Men unable to swim	5
	<hr/>
	42

Making a total in the squadron—

In class (1)	60
„ (2)	11
„ (3)	11
	<hr/>
	82

Tuesday, May 2nd.—The good swimmers paraded with their horses, the remainder without horses (at the tank).

The following points were explained to the men—

- (1) That in entering a river the horses should be ridden in until the horse is out of his depth, when the man should slip off to the down-stream side and hold on to his horse by his mane.
- (2) The reins should be knotted and a lock of the mane put through the knot to prevent their slipping over the horses head.
- (3) That the horse should be guided by splashing water into his face. (In practice this proved to be useless.)
- (4) That in cases where a horse showed no disinclination to cross a river, that it would be as well to catch hold of the horse by his tail as it leaves him free and does not impede his swimming action; having impressed these points upon them, each man in turn was made to enter the tank with his horse and swim round it.

Half the distance the horse was held by the mane, the other half by the tail. The men who could only swim a little, were given an hour's swimming practice. Those who could not swim at all were placed under instructors and taught to swim by means of a rope fastened round their chest and under the armpits, and which was attached by the other end to a pole. The pole was held by a man on the bank.

Wednesday, May 3rd.—The squadron paraded at the tank for

* Should be ten.

E. E. MONEY, *Major.*

instruction in making rafts. The only available materials at the time were lances, leading ropes, and mussucks, of the latter of which there are *eight** per squadron. After many experiments we evolved a raft which, I think, is as good as can be made with the materials. To commence with, a lance is non-supporting, as it will not float, therefore the mussucks have to carry the weight of the lances in addition to anything that might be put on them. It therefore became necessary to utilize as few lances as possible. (Plate I.)

The following materials are necessary to make a raft—

Lances	...	...	...	...	30 (or 20)†
Leading ropes	...	...	...	...	12
Mussucks,	...	...	...	...	4†

Fig. (III.) shows how to commence the raft; there are four lances each side and four through the centre. These lances are then lashed at the corners so as to make a square with 6' sides the whole length of the lance being 9' 7". If a larger square is made, the lance shafts are apt to be broken with the weight placed upon them. Care should be taken to have two complete sides free from points. This can be done if the lances are arranged as shown in diagram. Ten lances are then slipped in between the lances forming the frame-work (Fig. II), and are evenly distributed over the surface. They should then be securely lashed in position (Fig. I). The four mussucks having been filled with air and securely tied up, are now fastened on to the four corners of the raft but well underneath. If a fifth mussuck is available (and it is very necessary), it should be fastened in the centre. The raft (which can easily be carried by a couple of men) can now be turned over and placed in the water.

A raft of this description will carry four maunds without sinking to the level of the water. Its weak point is, that in the event of the air escaping out of the mussucks to any great extent, the whole thing would sink. But I need scarcely remark that if planks or any cut wood was available that a raft of the above description would not be made. I had a raft of lances taken across the river with a considerable weight upon it. It was perfectly buoyant, though the strength of the current caused the water to wash over it to a certain extent.

It is presumed that on service the men would carry the canvas chagul, patterns of which are kept in all store-rooms. I found that

† Half the number of lances can be used, but it makes the sides rather weak. It is better to make one raft with 8 mussucks than two with 4.

after having them well soaked with water they became air-tight. Some thirty or forty of these with lances would be capable of sustaining great weight.

When sending my raft across the river, I took the precaution of fastening a long rope to it with an inflated mussuck at the other end so that in case it had by any unforeseen accident sank, I should have been able to recover it.

Friday, May 5th.—Having the previous day found a place suitable for crossing, and having by personal experience found how difficult it was in a swift current to make a horse cross the stream, if he was unwilling to do so, arrangements were made to have a boat on the spot. The first two horses were towed across separately by means of a long rope fastened to their bits, the other end being held by a man in a boat. Each rider holding on to his horse's mane and guiding him as far as possible. When the third horse was being towed across, another man was ordered to put his horse in the water to see if he would follow the lead. This proved at the first, second, and third attempt a failure, as each time after the horse had been carried some way down the stream, he fought his way back to the bank.

After this, four horses were sent in at a time; two besides the towed horse, succeeded in reaching the opposite bank. From this time there was no further difficulty, all the horses, with about two exceptions, crossing without assistance from the boat. When a batch of horses entered the river, the men on the opposite bank used to shout. This had an excellent effect, as it attracted the swimming horses' attention and made them go for their companions. The horses were well fed on reaching the opposite bank. After this the horses were mounted and the men entered the water in column of sections with about twenty yards interval between sections and some five to ten yards between files. All the horses crossed without the slightest bother.

The results of to-day's practice went to show—

- (1) That horses don't fear the water.
- (2) That splashing water on a horse's face will not make him go the way you wish him to, if he has different ideas on the subject.
- (3) That if a horse objects to crossing, the only thing to do is to slip a finger through the ring of the bradoon and by swimming a little in front of him, force him to follow, but you must head your horse. Or if you tighten the rein further from you, you can keep his head half up-stream.

Saturday, May 6th.—The squadron paraded on the bank with horses in full marching order, and the men were practiced in packing their kits and making rafts in the following manner:—

The squadron having been dismounted, the order was given to unfasten leading ropes. Even numbers were then ordered to fall out and place their lances and leading ropes on the ground in front of their troops. As soon as this was done, odd numbers were ordered to fall out and do the same. The non-swimmers, to the extent of six per troop, were ordered to fall out as raft-makers, they having previously been

instructed in making them. While the rafts were being made, the remainder of the squadron were ordered to spread their blankets on the ground, to undress, unsaddle, and to tie up the whole kit in the blanket. After this each man was practised in making a raft and shown how the lances should be lashed.

Monday, May 8th.—The whole squadron paraded at the Kabul river at 6 A. M. The squadron was formed up and dismounted, as detailed above. Lances and leading ropes having been piled in front of troops.

The non-swimmers set to work to make the rafts, while the remainder of the squadron undressed and packed their kits into blankets. This having been done, a certain number of the 1st troop were told off to place the "1st troop kits" into the boat that was there for the purpose.

Four good swimmers were told off to each raft. The remainder of the 1st troop mounted and swam the river by sections with an interval between. Every horse crossed without giving the least trouble.

As soon as the 1st troop kits had been landed, the boat was loaded with the 2nd troop kits, the latter troop mounting and swimming the river in the same formation as the 1st troop. During this time the rafts which had been loaded with logs of wood to test their carrying capabilities, were successfully piloted across the river and were quite successful. The horses were now fed, and after an interval re-swam the river.

Wednesday, May 10th.—The squadron paraded again at the river. The 1st troop were instructed after crossing, to boot and saddle on the other side of the river, to advance a hundred yards, dismount, and fire a volley, with a view of seeing how long it would take.

Owing to there being only one small boat to take the kits across, and which had to make four trips, the troop took 45 minutes from the moment they received the order to undress and unsaddle to the time that they fired their first volley. I saw that with the assistance of a larger, or more boats, that the time could be considerably reduced.

The 2nd Troop was in the meantime employed in making a raft out of logs of wood, which was quite successful, only owing to its great weight, it had been taken some hundred and fifty yards down the stream before it was brought safely to the other bank. The horses were fed and then returned to the other bank, this time by troops, first front rank, and then rear rank.

Saturday, May 13th.—The squadron paraded on the banks of the river to swim across in presence of General Kinloch, commanding Peshawar District.

The 1st Troop was detailed to swim the river as on the previous day, and to remount and fire a volley to show how quickly it could be done. A boat was in attendance, capable of carrying all the 1st troop kits in one trip.

From the moment they received the command to undress to the firing of the first volley on the opposite bank, occupied exactly twenty-five minutes, but to the time they were mounted ready to attack was only twenty minutes. The 2nd Troop constructed a raft of lances and

mussucks, and two men being placed upon it, it was taken to the other side of the river. The rest of the troop swam across.

At the request of General Kinloch experiments were made to see if horses would cross the river forwards and backwards of their own accord if they were given a lead.

First eight men swam their horses across, four others being sent in without riders, and all crossed. On returning, the twelve men dismounted before they got into deep water, and the horses all made straight for the opposite bank without their riders. This of course means a great saving of time in the case of a regiment having many non-swimmers, as if they are properly trained, the horses of non-swimmers can be driven into the water with the rest of the regiment instead of men having to return across the river to take them over.

This concluded the swimming instruction of the 1st Squadron. I may add that at this date every man of the squadron present is capable of taking his horse across the river.

Plate II. shows construction of a log raft. This was made by the 2nd Troop on Wednesday, May 16th.

Plate II.

It was capable of carrying great weight, but being in itself so heavy, it was a somewhat difficult business getting it across the river. The space left at C, D, and E are necessary to enable one to securely lash the cross logs. The lashing shown in Fig II and III are, I think, the best to use, as they can be made very tight.

The diagram on Plate III shows how a raft of lances may be made with all the points protected.

The instruction in swimming, of the 3rd, 4th and the 5th troops was carried out on similar principles to that of the 1st squadron, and was conducted as follows:—

On the 15th May I commenced by examining all the men in the tank, within the regimental lines, and classified them as under.

	3RD TROOP.			4TH TROOP.			5TH TROOP.		
	Native officers.	Non-commissioned officers.	Men.	Native officers.	Non-commissioned officers.	Men.	Native officers.	Non-commissioned officers.	Men.
Good swimmers.. ...	1	7	31	...	9	34	1	8	27
Indifferent-swimmers ...	...	...	6	...	...	...	...	...	...
Non-swimmers ...	...	...	8	...	...	4	...	...	3
TOTAL ...	1	7	45	...	9	38	1	8	30

The indifferent and non-swimmers paraded twice daily at the tank

Further instruction of indifferent and non-swimmers.

Examination of horses in swimming.

I paraded all the horses of the 3rd, 4th and 5th troops (including the young ones) on the 15th and 16th May at the tank, and made the good swimmers take them round. The majority of the horses swam very well. Some few were rather awkward and nervous, and one (waler) mare only was unable to swim.

The three troops paraded on the banks of the Kabul river, near

Crossing the Kabul river.

the village of Khazana, at 6 P. M., on the 17th May. With the assistance of a boat I towed one horse across the river; then returned and towed another, ordering four others to follow; two of the latter swam across very well, the remaining two turned back to shore again. I then towed two horses across and ordered eight others to follow, of which only two returned to shore. The horses seemed to see now what was required of them, and the remainder of three troops crossed by "fours" (eight men), with the exception of two horses I was obliged to tow across. As each horse arrived on the opposite bank it was placed in a conspicuous position, and as near to the water as possible. It was then fed. While crossing, a great many men remained on their horses' backs for a considerable time, others for a shorter period and few rode across.

It appeared to me that the best plan was to remain mounted as long as possible, and then to stretch full length over the horse and swim with him keeping slightly on the down-stream side, as by so doing, you can direct the horse very well. Some men got off and then on again when in difficulty. I particularly noticed that men, who threw themselves off as soon as their horses got into deep water, seemed to have a great deal more difficulty in steering their horses straight. The troops re-crossed the river by troops in line most successfully.

On the 18th and 19th May the men were instructed in making

Instruction in making rafts.

rafts. I confined myself to two kinds, viz., the one recommended by Captain Peyton capable of carrying four maunds and constructed with the following material, viz:—

- 30 Lances,
- 12 Leading ropes,
- 8 Mussucks,

and another kind, evolved by myself (see Plate IV.) capable of carrying

Plate IV.

7½ maunds, i. e., the kit (with the exception of saddle) of an officers' patrol of 8 men or one "group," and constructed with the materials a party of that strength could actually carry on service, viz,—

- 8 Lances,
- 6 Leading ropes,
- 6 Mussucks and,
- 4 Tent poles

To test the above, I paraded, an officer's patrol, under Ressaidar Sunder Singh, which crossed the river successfully. The horses were

taken across with their saddles on, and 5 men, corresponding in weight to eight men's kits, were placed on the raft and taken over.

The three troops paraded in marching order at 6 A. M. on the 20th instant, to practise crossing the Kabul river again. The river was in flood this time. Each troop in succession was ordered to dismount and tie up their kits in their blankets, put them on to a big boat, moored by the bank for that purpose, then swim their horses across; on arrival at the opposite bank they were to dress and re-saddle, advance 200 yards in reconnoitring formation, and fire five volleys, then retire.

I took the time each troop took to carry out the above from beginning to end, and it was as follows:—

3rd Troop	...	...	...	...	...	21 minutes.
4th	"	...	...	...	...	22 "
5th	"	...	...	...	...	19 "

The horses were taken into the river by "sections," with intervals of two yards and distances well kept. The crossing was most successful. The non-swimmers assisted each troop in getting their kits into the boat, and also were employed in making rafts.

When re-crossing the river, a few horses were driven over. Some men were sent over in charge of two horses. They all crossed without any difficulty.

The "column" formation succeeded better than the "line," which I attribute to the advantage the horses of the former got by having some good swimmers put among the leading sections to give a good lead. I was very fortunate in having a large number of strong swimmers, who were able to manage the horses properly to begin with, or otherwise I might have been obliged to practise the troops more than I did.

Formation for crossing.

Strong swimmers for early lessons.

I attribute to the advantage the horses of the former got by having some good swimmers put among the leading sections to give a good lead. I was very fortunate in having a large number of strong swimmers, who were able to manage the horses properly to begin with, or otherwise I might have been obliged to practise the troops more than I did.

CAVALRY MANŒUVRES.

By Lieut.-Colonel P. NEVILLE, 14th Bengal Lancers.

Manœuvre, in a cavalry sense is of two kinds—peace, and war.

Peace manœuvre is again subdivided into two parts, the first consisting of drill on the parade ground, and the second of sham fights between bodies of varying magnitude, from squadrons to divisions. Its object is to teach strict discipline in the ranks and implicit obedience to word of command under all circumstances as well as to habituate men and horses to the exercise at a rapid pace of those evolutions most likely to be required of them in time of war.

War manœuvre, on the other hand, is the art of handling troops in such a manner that an advantage may be gained over the enemy. In this, all great cavalry commanders have excelled; witness Murat, Lasalle, Moutbrun, Kellermann, Ziethen, Seydlitz—and proficiency therein gives power to a small but well trained cavalry force to contest with superior numbers of inferior troops.

Success in this art will depend, not alone on the individual skill of the leader, but also on the intelligence, and quickness to grasp the situation at a glance as it develops, and seize an opportunity, of the officers under his command. Many writers, following the German lead, make a great outcry about simplicity, saying that it is dangerous to manœuvre in the presence of an enemy, and on this is based the German system of a general attack in one long line with but a trifling reserve.

Such a form of attack may be suited to large numbers of imperfectly trained troops, but with the material we possess there should be neither danger nor difficulty in any kind of manœuvre, if practised in time of peace. The carrying out of these rests with the officers: the men have nothing to do but obey orders and close to the centres of their troops. Fighting, no doubt, is dangerous work, but for us, unless we excel in mobility and skilful leading, it will be worse than dangerous; it will be disastrous.

Without superior manœuvring power, our inferiority in numbers will be fatal in the field.

The main principle of manœuvre is working on interior lines, and *concentration* is the key of success.

As in infantry tactics, the cavalry leader should aim at bringing a greater force to bear on his objective than the enemy can bring (within a limit of time) to meet the attack. Once a body of cavalry is routed—and it must be borne in mind that defeat is as often moral (resulting from the superior handling of one side) as material—that is to say, once it begins a disorderly retreat, a very small body in pursuit will suffice to turn the retreat into a stampede and prevent the troops from rallying.

The victorious side, on the other hand, can very quickly rally, and *the troops are then available for service at another part of the field.*

This is one way by which, when the forces are unequal, the weaker side must endeavour to make up for want of numbers.

Disposition plays an important part in manœuvre. Major von Hoëmig, writing on this subject says: "Cavalry fights cavalry by grouping its forces in the most varied manner."

It is this variety of manner of grouping his units, great or small, that provides a field for the genius of the commander. Surprise is one of the greatest aids to success, and to effect this there must be concealment.

If this is not afforded by the ground or other natural cover, the troops must be disposed so as to cover one another. (As in Plates IV and VI.)

In all cases where a surprise of this kind is designed, as in Fig. 12, Pl. VI., special precaution must be taken to prevent the hostile scouts from getting round the offensive flank and thus detecting the squadrons in rear.

This flank must be guarded by strong patrols.

To work on interior lines, there must be concentration. But, it is a generally recognized principle that cavalry should engage on a broad front.

This is very true, and concentration is therefore only possible up to a certain time. The meaning of the axiom "concentration is the key success" is that no extension of front is permissible until the commander has formed a definite plan of action and communicated it to his brigadiers and artillery commandant.

The term "a broad front," however, must not be taken to mean a straight line of squadrons, but rather a disposition of the troops echeloned in depth, ready to form a front of any required extension.

Before the manœuvring phase is reached the cavalry leader should have, as aids to success—

- (a) Early and correct information as to the position and strength of the enemy.
- (b) A good general idea of the nature of the ground on which the fight will eventuate.
- (c) A knowledge of the enemy's *usual* method of conducting an engagement.
- (d) The power of rapidly forming in his own mind a plan of attack in accordance with the foregoing heads, taking into consideration the composition and *morale* of his own troops.
- (e) The power of synchronously forming, in the view of the general situation of the campaign (strategically and geographically,) his plans to suit either event, of victory or defeat.

Information will best be obtained by officers' patrols. The officers for this duty should be carefully selected. They should be intelligent and experienced men, having a good knowledge of their profession, and capable of arguing, by induction from apparent facts, true inferences. That they should be good riders and well mounted, goes without saying,

but it is a cardinal error, to my mind, to send young and inexperienced officers on a service of this description, however keen or zealous they may be.

Early and correct information is the key-stone of the arch of victory, and the key-stone is worthy of the best material and workmanship.

All information in the near proximity of the enemy should be sent direct to the general officer commanding and not through any intermediate channel.

- (b) In order that the general should avail himself of the second aid, it is necessary that he survey with his own eyes the intervening ground and observe, himself personally, the enemy's disposition.

When the hostile force, then, is reported about 3 miles distant, he should, as a rule, halt the division, and gallop to the front, taking with him his brigadiers and commandant of artillery.

To avoid being cut off by parties of the enemy, he should take a sufficient escort—as, a squadron.

During the advance, a couple of staff officers may be directed to ride half a mile or so on the right and left of the general, the better to observe the natural features of the ground which they should carefully commit to memory.

On arrival within sight of the enemy's main strength, the general commanding should ride a-head entirely alone, leaving his brigadiers and escort halted.

He should advance as close as possible, keeping in concealment, and rapidly observe and note the following points;—

The enemy's apparent strength in cavalry and guns—His troops, whether regular or irregular; heavy, light, or medium.—Their armament, whether lance or sword, and also whether any cuirassiers.—Their disposition, order of march, &c.

Having noted as much as possible of the foregoing, he should gallop back to his brigadiers and staff and quickly arrange his plan of attack, which he should communicate to these officers.*

- (c) When forming his plans, it will be of great advantage to the general to have a knowledge of the enemy's *usual* mode of attack. As, for instance, if he sends a cloud of irregular troops to menace the flanks and rear of his opponent, and then attacks with his regulars in the centre. (A method frequently employed by the Russians.) If he usually forms 2 lines, or 3:—If he prefers a strong first line and weak reserve, or *vice versa*.

When opposed to civilized troops, much of this may be learned from books: after a few skirmishes with an uncivilized foe, experience will be gained of his usual method.

* The enemy's commander will also endeavour to push to the front and discover all he can of our side.

The General must therefore keep a sharp look-out for the hostile staff, and with his escort cut them off, or, at all events, drive them back so as to baffle their attempts, if possible.

(d) It is here that the genius of the man comes in.

The general now knows all about his own troops and a certain amount about the enemy's.

He also should be acquainted with the capabilities for attack or defence of the ground he has passed over.

The first consideration, of course, will be the balance of numbers. Which is the stronger, he or his opponent? On this will mainly rest the question of offence or defence.

If they are about equal, the features of the ground will play a prominent part. Then the capable General will consider the *morale* of his troops, whether flushed with victory, when a dashing offensive would commend itself, or recovering from a reverse, when it might be prudent to fight at first on the defensive, ready at the first gleam of victory to assume a vigorous counter offence.

The freshness or otherwise of the horses is also an important point, also the composition of the force.

For example, in India, if a division were composed of British and Native troops, it would be a question which should form the line of battle and which the reserve.

Again, heavy troops are usually placed in the first line to bear the first shock. All these points must be rapidly and comprehensively reviewed, and a concise plan evolved in accordance with the general result arrived at.

(e) Almost simultaneously, it will be necessary for the divisional commander to decide on his plans to suit either event, of victory, or defeat. If success attend his arms, he must direct his brigadiers as to the nature and extent of the pursuit he desires, and the nature of the measure to be taken to prevent the enemy from rallying. Precise orders must be given to the artillery commander, who must understand clearly his restraining limits, as well as the field open to his individual judgment. Should a reverse occur, the brigadiers must be instructed as to the general line of retreat and the rallying points where they should endeavour to make a stand. The artillery commandant must be especially informed of the points in his rear where the greatest amount of resistance must be offered to the enemy's pursuit.

When the brigadiers are acquainted with their several *rôles*, they will gallop back and place themselves at the heads of their brigades: the artillery will take up the position assigned to it, and the preliminary manœuvring will commence.

I must here say a word about the practice, which I have seen and deplored, of trotting a division up to an unknown situation.

Whether this arises from a laudable but mistaken desire to take the initiative, or from a nervous dread of seeming to hesitate, it matters little. The practice is bad and unsound.

Until the divisional commander has formed his plans and clearly explained them to his brigadiers and artillery commander, so as to secure unity of action throughout his command, no forward movement is admissible.

It was this very precipitancy which marred Pultz's action at Custozza, and it is difficult to imagine what advantage those leaders think they gain by hasty movement while completely ignorant of the situation in front.

A pursuing force must of course move at a trot. The essential here is that the troops be kept concentrated as far as possible, but in all other cases until the General has formed a concise plan of action and explained the same to his subordinates, "*Festina lente*" should be his motto.

Once the general idea is known to all, the time has come for action prompt and vigorous, *but*, vigorous action is not always ensured by a speedy advance.

It may be, and frequently will be, necessary to make a considerable flank movement first, so as to secure the greatest advantage from the features of the ground, and it is essential that this movement should be effected *with the greatest possible steadiness and deliberation*.

Anything like undue hurry in the preliminaries of a fight, has a demoralizing effect on cavalry, and should therefore be carefully avoided.

It is now universally admitted that anything in the shape of a preparatory formation is bad and unsound, as also any stereotyped normal formation for attack.

There will always, however, exist certain conditions favorable to one side or the other, and that leader will have the advantage, *ceteris paribus*, who knows how to secure the most of them.

Certain of these are beyond human control, as wind, and sunshine. The former, in India, where dense clouds of dust most frequently attend cavalry manœuvres, is an important factor.

That side will decidedly score which is working to windward, as their own dust will blow behind them, leaving an unclouded field of vision, while that of the enemy will clearly mark their position and movements, and, at the same time blind them to what is going on in their front.

When the sun is low, *i.e.*, early or late in the day, it is well to have it behind one; but these conditions must, of course, be faced as they occur, with the proviso, that they may be modified by changes of position, where such changes do not militate against the strategical situation.

The other conditions, however, are subject to control. Amongst these are:—

1. The artillery initiative.
2. The maintenance of its fire for the longest time.
3. Compelling the enemy to change his front so that his guns may be masked.
4. Compelling the enemy to a change of front that will bring his lines under an enfilade fire.
5. Deceiving the enemy by a feint into deploying his attack in a wrong direction, so that his flank may be exposed.

Four-fifths of these have to do with artillery. The reason is the demoralizing effect its fire produces.

The time for artillery action will always be short. Its fire is frequently masked by the advance of its own cavalry. When the first lines

are engaged, it can usually only aim at the hostile battery or the reserve. An important advantage, therefore, is gained by that side which opens fire first. The French writer "A. A." says.—"The commander, (of artillery) put in possession of the general idea of the divisional commander, should not wait for further instructions. He should sacrifice precision of fire to rapidity of entry into the fight, and aim rather to secure moral than material effect."

The first point then that the division leader should decide, when forming his plans, is the position to be occupied by his guns.

This he will communicate in general terms, leaving it for the O. C. H. A. to select the best spot for coming into action. This will be one that gives an extended view of the field of battle having in front a screen, as, of brushwood, low crops, &c., &c., which will render it difficult for the enemy to find their range.

The second favorable condition is the maintenance of fire to the latest possible moment.

As the enemy's cavalry approaches, the artillery fire will become more and more effective and demoralizing.

The guns should be so placed that the advance of their own cavalry should not mask their action.

This may be done either by giving them an initial position well forward on a flank, or by moving the division itself sufficiently to a flank after the guns have unlimbered.

The nature of the ground will most often decide which method is preferable when the general has had an opportunity of surveying it. It will however often happen that the enemy's cavalry will so suddenly appear in view that fire must be opened without a moment's delay, when the artillery must come into action wherever it may happen to be, the division manœuvring to a flank as above mentioned.

There is another way of maintaining fire to a later moment than the enemy, which consists in refusing the flank of the attacking line nearest the guns; an example is given in Plate III, and Fig. 3, Plate IV.

The 3rd and 4th conditions must depend on the skill of the leader. These are questions of manœuvre, and no precise rules can be laid down. Examples of both are given in the illustrations.

The last condition is one which will depend partly on generalship and partly on the opportunity afforded by favorable ground. It is a most useful and effective aid to success especially when the enemy favors a strong first line attack, which is slow in changes of front.

To illustrate this, I will give two instances which occurred during manœuvres in India, of which I was witness.

In the first, a retreating force, A, (Plate I. Fig. 1,) took up a position E. of the village of D—, behind some high crops. From the line of crops, the ground sloped gently down to the canal, which was fordable at all points.

At C. there was a fort on a hill some 80 or 90 feet above the level the country round: here the A side had a look-out post which signalled the approach and formation of the pursuing B. Division.

The A. guns were posted on high ground some 1,000 yards to N. N. E. of C. They were directed to reserve their fire until the moment of attack.

From the A. first line to the canal was about 1,200 yards. The B. Division approached the canal, but their scouts were so baffled by the A. screen that none of them could cross it. When their leading Brigade was about $\frac{1}{2}$ mile from the canal, a regiment was sent from the A. reserve round the W. and S. W. of the village, which debouching on the plain, formed line (with much dust.) The B. first line crossed the canal in squadron columns, when the decoy regiment changed position left back. (Fig. 2.) The B. commander then ordered a change of front to the left. When this was about half completed, the A. general gave the signal to his guns, which opened heavy fire, and attacked as shown in Fig. 2.

In the second instance (Pl. II. Fig. 1.) the A. Division was concealed behind a garden in close column of Brigade masses. The Bs. were advancing, from the north, about a mile off.

The A. guns were placed as shewn, and opened a heavy fire, while a decoy regiment was sent out, which galloped backwards and forwards raising dense clouds of dust. This deceived the B. side which formed line about 1,500 yards off.

The A. force then galloped out to the N. W. as shewn in Fig. 2, behind the cover of the trees on the main road, wheeled into line to the right, and attacked the right flank of the Bs., who had commenced their gallop (at a cloud of dust).

I will now give three examples of manœuvre, illustrated by Plates III to VI.

They are merely *illustrations* of the subject and are not intended to *prove* anything whatever.

The Red, throughout, is the manœuvring side, but I have made the Blue Division act in a rational and natural manner. I mean that I have nowhere, intentionally cramped their action in any way to make things easier to the Red side *

The first is a case of forcing the enemy to an unfavourable change of front, whereby his guns are masked, his troops are exposed to an enfilading fire, and his flank is turned.

In Plate III, two divisions of equal strength are approaching each other. For simplicity and clearness, all advanced guards and detached parties which would complicate the sketch, are withdrawn on both sides. The Red commander has ridden forward, as above described, and surveyed the ground.

He approximates the strength of the enemy to about that of his own force. He notes the hill where their guns are shewn, and considers it

* Such a subject is exceedingly difficult to illustrate, there being in actual war, a thousand and one considerations of ground, weather, *morale*, *superiority of commanders* &c., &c., which can have no place in the illustrations.

I was at first inclined to leave the sketches alone, but I found the making of them, with the various calculations involved, so interesting to myself, that I hope they may prove interesting also to others.

probable they will place them there. He sees that no manœuvring can take place to the E. because of the railway: he therefore argues that the Blues will most likely attempt an out-flanking movement to the S. W., and forms his plan accordingly.

Galloping back to his brigadiers, he orders his guns into action just clear of the high crops in front.

In the meantime the Blue scouts having observed from the hill the position of the Reds, the Blue commander sends his guns to occupy the hill. The artillery on both sides open fire about the same time, and the opposing forces are in the position (a.)

Remarks.

It is impossible here, from the general situation, for the Red commander to take advantage of the initiative of fire! 3,000 yards off, there happens to be a hill which discovers the movements of his troops and which is suitable for an artillery position. He therefore can only come into action with his own guns as quickly as possible.

On the opening of fire, the Blue commander commences the movement to his right front which the Red general had anticipated, his object being to secure for himself Nos. 3 and 4 of the controllable conditions before mentioned.

The Red general now has to frustrate this design and force the Blues to an unfavorable change of front. To this end, he *starts on an interior line*, heading due west with his leading brigade in column of troops. To mathematicians, the advantage of this movement will be clear. The Red force is moving from the right-angle of a right-angled-triangle, along the base, while the Blues are traversing the hypotenuse from an opposite angle. The head of the Red column then, will reach the intersection of their respective directions first, the pace being equal; in other words, the Red side can out-flank the Blues. This movement is continued until both sides are in the position (b), about 1,500 yards.

Remarks.

The Blue commander here recognizes the futility of a further advance in this direction, and has three courses open. He may head west, form line to the south, or retire. The first, he deems inadvisable. The Reds have the start of him on parallel lines. If he move west, they may withdraw their guns, under cover of the high crops, and, getting them into a new position, (somewhere in line of defilade No. 1.) assume a new base, which would necessitate a change of position for the Blue guns. To retire he is, of course, disinclined: he therefore adopts the only alternative and orders line of squadron columns to the S.

The Red general, seeing this, changes direction by a small angle, (about 20°) to his right, and directs his support to close up on the flank, and his reserve to send a regiment to reinforce the attacking brigade.



Remarks.

The support and reserve are properly kept concentrated. The enemy's artillery being over 4,000 yards distant, it cannot do much damage.

The Blues, having formed line of squadron columns, advance as far as (c) and, noticing the Red change of direction, bring up their left shoulders as shown at (d). By this time the Reds are in position (d). The Red commander now wheels his attacking brigade into line, and orders an advance in echelon of regiments from the left, at half distance, one regiment from the support to prolong the line on the left. He directs the reserve to move up behind the high crops, as shewn at (e). The commander of the Red support forms an echelon on the left, his inner regiment in line, the outer, in mass at deploying interval.

Remarks.

The advantage of the Red manœuvring now becomes apparent.

1. They have compelled the enemy to make a change of front which masks their guns up to line of defilade No. 1.
2. This change exposes their line to the semi-enfilade fire of the Red guns.
3. It also brings the flank of the Blue line to within about one-third of the artillery range to which any portion of the Red force is exposed.
4. It has enabled the Reds to out-flank their adversaries.

It was, of course, open to the Red commander to advance in line from (d), when his right flank at (e) would have been upon the point (x).

The echelon formation, however, has its advantages. First, it does away with any risk of masking the artillery: then it gives the reserve, which has taken up a favorable position in concealment, the advantage of being able to strike at the enemy's flank as he advances.

Five of the Red regiments are now defiladed from fire, and it must be observed that the left flank of the Blues and their reserve Brigade have had to gallop 1,470 yards, while nearly all the Red side have been moving at a trot.

The Blue first line now deploys, and a regiment from the reserve is sent to prolong on the left. The line advances to the position (e) and the reserve regiment forms squadron columns. The Red Division is in the position (e).

Remarks.

The Red commander does not fear being out-flanked on his right, seeing the position of his reserve. On his left, he has a regiment to spare, and the fire of the Blue guns is now bounded by the line of defilade No. 2, while his own artillery has an open field for its fire.

Both sides now commence to gallop and the first collision takes place on the line (f). The outer regiment of the Red support stretches out at a gallop, and wheeling into line to the right, attacks the flank of

the Blue second line. This leaves the inner regiment free, which will rapidly gain the enemy's rear.

The Red reserve deploys a regiment and charges the left flank of the Blue line, which in its advance is exposed to an enfilade fire at 800 yards.

Remarks.

In this example, though the forces are equal, yet one side by superior manœuvring has gained a decided advantage.

The next example is one of a turning movement. Plate IV shews a rear-guard action. A Blue force is retreating N. covered by its cavalry division. A Red division is sent in pursuit and an action is forced on the Blues. (Fig 1).

The Blue side, tho' of equal strength to the red, has strong flank guards out and can only bring into the fight 20 squadrons against the Red 24.

The Red commander determines to envelope the Blue right flank, and, if possible, cut off his line of retreat.

Remarks.

For a movement of this sort to be successful, it must take the form of a surprise. If a wide turning movement is attempted, the enemy not only sees what is intended, but also can estimate the strength of the attack, and, by a judicious retreat may defeat the attempt. This he can the more easily do as he will then be moving on interior lines.

He therefore endeavours to conceal his strength at first, by adopting the formation shewn at (a).

He directs the head of his echelon on the Blue outward (from the guns) flank, and sends a strong battle patrol to his left front to prevent any hostile scouts getting round that flank. This patrol has orders to rejoin on the first collision.

Remarks.

I cannot agree with the rule in the drill book that combat patrols are to remain out during an action, except under special circumstances. I think it ought to be just the other way, and that they should *only* remain out under special conditions. By the time the collision takes place the patrol will have seen and noted the position of the whole of the enemy's force. There is little then to be feared from surprise while every available man counts in the *mêlée*, and one or two scouts on the flank ought to be sufficient for all ordinary precaution.

During the advance from (a) to (b) the leading regiment of the Red left brigade deploys into line. This tends to minimise the effects of artillery fire and also to form a better screen to conceal the 5th and 6th regiments. The reserves (4 squadrons) close up to 200 yards from the support. The intervening space is now 1,200 yards.

Remarks.

On Paper, the formation adopted here would seem dangerous in the view of enfilade, but it is not so in reality. The Blue guns are, at

(b) 2640 yards from the nearest point of the Red échelon. The range tables for the 12-pr. B-L. gun in use in our service, give the angle of descent for 2,600 yards $6^{\circ}14'$ for carriage Mark I., and $\frac{1}{2}$ for carriage Mark II.

This means that a mounted man directly in the line of fire would be safe 25 yards either side of the point of impact, and as at this range 50% of rounds should fall within 23 yards of length, the dangerous catch for enfilade is fixed at $25 + 25 + 23 = 73$ yards, or, allowing for the scattering of shrapnel bullets,—say 100 yards. Suppose, however, that the range was but 1,000 yards;—the dangerous catch would be $104 + 104 + 20 = 228$ yards, or, allowing as before,—250 yards. It will thus be seen that there is no more than ordinary danger in the formation, but, even if there were, the Red commander is bound to risk it. The whole success of his scheme depends in keeping the enemy in ignorance of his strength and disposition.

The Red leader now orders his No. 4 regiment to increase its pace and take deploying distance ahead of No. 3: Nos. 5 and 6 to conform to this movement, the latter forming columns of troops. (Fig. 2.)

Remarks.

The Red division is now in echelon of regiments from the left, with two regiments in rear of the head of the echelon. These regiments, on a plain, would not be visible from the front.* No. 6 is beginning to take ground to its left to clear the flank. It will be noticed that the four leading regiments are defiladed from fire at this point, while the whole of the Blue force is exposed. This advantage is gained by the refusal of the Red right flank next their guns.

In Fig. 3, Nos. 3 and 4 Red are in collision with 1 and 2 Blue. The, hitherto concealed, brigade is clearing the flank at a gallop. Only the rear regiment, Red, is under fire, while Nos. 3, 4 and 5 Blue are exposed.

Fig 4, shows the situation 34 seconds later. The *mêlée* is now general. The Blue commander sees turning movement and, to meet it, forms line with his reserve $\frac{1}{2}$ right about. This has to be done under the fire of the Red guns. The Blue guns can only fire at the Red artillery.

Remarks.

I cannot agree with those writers who maintain that Horse Artillery should disregard the enemy's guns and only fire at the cavalry.

The battery is stationary: in most cases its range can be quickly found, and, as it is just as important to keep down the enemy's fire as to harrass his horse, at least two of the guns should be told off to this duty. A well-directed and sustained fire of shrapnel will have a most demoralizing effect on the enemy's gunners and, if it does not disable the battery, should at least make their shooting wild and innocuous.

* If Lancers, the pennons would have been removed and lances (probably), brought to the trail.

The situation in Fig. 4, admits of little discussion. Supposing the troops to be equally good, morally, and physically, the *mêlée* will probably last for some three minutes before one side begins to give way. At the commencement of this period, the Blue No. 1 finding its flank and rear turned, will retire at full gallop towards the guns, pursued by a squadron. Red No. 4 will rally and detach a troop to attack the rear of the next grade of the echelon, which, finding itself attacked in rear, will also give way and make for the guns. The third Red regiment, thus set free, will likewise rally and act in a similar manner, so that, step by step, the Blue line will be driven back on their guns, while the Red grades, rallying, will continue the turning movement.

Remarks.

At the end of the first minute—

The flying Blue regiment, urging their horses to full speed, will have covered about 586 yards.

The Red No. 4, will take one minute to rally and tell-off, and by this time the flank troop will have fallen on the rear of Blue No. 2.

Red 5 and 6 will have covered 440 yards; the Blue reserve, 440 yards. (Fig. 5, Pl. V.)

What will naturally take place now is somewhat as follows :—

Blue No. 1, in flight passing across the front of its formed reserve, will instinctively wheel round to the E. to rally on it. The reserve will detach one or more troops to attack the pursuers in flank.

The Blue commander, seeing the superior force opposed to him, will fear for his line of retreat and, instead of attacking, will endeavour to fall back and take up a new position.

He sends word to his guns to retire and select a favorable spot for action, and to his troops engaged, to fall back on the road, and he, himself with No. 5 regiment makes a course N. N. E.

Remarks.

The Blue artillery commandant recognises the necessity for retiring before this order reaches him. Owing to subsequent events, the order to retire is effective as regards the Blue cavalry. The movements of Blue 5, will be hampered by the fugitives crossing in front.

Red 5 and 6 move steadily on, followed by 4 (two squadrons + 3 troops.)

Blue 2, taken in rear, will fly towards the guns, pursued by a squadron of Red 3, which will rally and send back its flank troop against the rear of Blue 3.

The Red guns, being now useless, (friend and foe being mixed up) will limber up and gallop N. W. keeping in rear of the engaged echelon. (Fig. 6, Pl. V.)

The events of the 3rd minute may be summarised as follows :—

Blue 1, wheeling round clear of No. 5 will close to rally. No. 5 will continue its course for the road, 2 and 3 continue their flight. No. 4 is attacked in rear. The guns reach the road.

On the Red side, 5, 6, and part of 4, keep on their course. The pursuing squadron of 4 has been driven back and is closing. No. 3 (2 squadrons and 3 troops) follows 4. No. 2 rallies and sends the flank troop back against the rear of Blue No. 4. The guns cross the road (Fig. 7.)

Figure 8, shows the situation one minute later.

On the Blue side, No. 5 keeps on, rejoined by the detachment which was sent to clear No. 1. The latter regiment is rallied. No. 2 has shaken off its pursuers, and is closing. No. 3 and 4 are still in flight. The guns are in full retreat.

The Red Nos. 5 and 6 here slightly changed direction and are heading to cut off Blue 5. No. 4 follows. Nos. 3 and 2 are closing up the former being rejoined by its retreating pursuers. No. 1 is rallied. The guns keep on their course

Remarks.

The situation is now difficult for the Blue commander. Each of his regiments, except No. 5, has suffered a reverse and consequent demoralization. Only No. 1 is rallied. The enemy is aiming to cut off his retreat and is only 400 yards off. What shall he do? There are apparently two courses open to him. (a) To avoid the combat for a few minutes by retiring S. E. so as to allow his disorganised troops to rally. He might then form a new front of battle and cut his way through his opponents. (b) To make a vigorous attack on the head of the Red division with his fresh No. 5, overthrow them if possible, and thus give his force an opportunity to rally and fall back on their line of retreat.

The first plan has the disadvantage of cutting him off from his guns and exposing his troops to an enfilade fire. To retire, moreover, S. W. when his proper line is N. would have a demoralizing effect on already shaken troops, and if the Reds pursue vigorously they may not be able to rally at all.

He therefore decides on plan (b).

The Blue commander sends word to his guns to support him, and to his flank guards (4 squadrons, not shewn), to concentrate on the road. He wheels No. 5 into line to the left and attacks the leading Red regiment (Fig. 9.)*

Remarks.

The Blue General has sent word to his flank guards to concentrate on the road. These he hopes, will form a *point d'appui* to rally on, but they can hardly come up in time to be of much use in deciding the issue of the present fight.

The Red leader has now a problem in manœuvre to solve. His leading regiment is attacked by an equal force and the Blues have two regiments rallied to support this attack.

All his own squadrons are closing up except one in pursuit. If he forms a general line to his right, he may drive the enemy E. but his

* This figure gives the positions half a minute later than Fig. 8.

object is to cut off their retreat. He must therefore continue the turning movement, so as to get N. of them.

He therefore orders No. 6 to pass in rear of 5, and turn the enemy's flank.

The commander of Red No. 5 forms to his right to meet the attack and orders a flank attack by his 4th squadron. Nos. 4 and 3, get orders to front E. and attack in echelon of wings from the left of No. 4.

This formation helps the turning movement by refusing the Red right flank.

Fig. 10, gives the situation at the close of the 5th minute after the events of Fig. 4. (i.e., half a minute later than Fig. 9. *N. B.* In figures 5, 6, 7, 8 and 11, one minute has elapsed since the events of the preceeding figure, but in 9 and 10 but half a minute.)

The commandant of Red 6, seeing the Blue guns unlimbering near the road, sends a squadron to attack them, while with 3 squadrons he heads eastward.

Blue 5, is attacked by three squadrons in front and one on each flank. Red 3 conforms to the movement, forming echelon of wings, Red 2, having closed up, wheels into line to it's right.

Red 1., seeing it must form the reserve, heads N. at a trot. The Red guns come into action.

Remarks.

The question of whether artillery can be successfully attacked in front by cavalry, is a moot one. Most artillery officers will tell you "No."

It is certain that with our new 12-pr. B. L. gun of flat trajectory and great initial velocity, such an attack would be most perilous, but in this instance the Blue guns cannot fire to their proper left of the line of defilade, shewn in Fig. 10, without risk of injury to their own side. The Red squadron, then, has only to bear away to their right and get round the left flank of the Battery. The commandant of Red 6 would have recognized this fact when ordering the attack.

Fig. 11, shows the turning movement completed as for as demonstration is required, at the close of the 6th minute from the general collision in Fig. 4. The Blue guns, after one or two rounds, have limbered up and are in full retreat, pursued by the Red squadron.

Blue 5, attacked in front and on both flanks, gives way, and is forced (by the pressure of the flank attack as well as the interception of Red 6.) in a S. E. direction.

Red 5, rallying to the right, threatens the flank of Blue 1., which gives way. Blue 4, has had to rally under the concentrated fire of the Red guns at 800 or 900 yards, and it is very doubtful if, under the circumstances, it would have been able to take any further part in the fight.

Remarks.

Although the Blue side have acted in the example very much as I believe they would naturally have done, there is a point in Fig. 6, which deserves consideration. Suppose the officers of the flying Blue No. 1, recognizing the importance of holding their line of retreat, had had sufficient control to direct (tho' at this stage powerless to check) the flight, and, instead of wheeling round to the E., they had gone stright on N. E. What difference would this have made?

It would have made it easier for the Red side by taking 4 squadrons out of the fight.

The Red commander would, under such circumstances, have acted somewhat as follows. A squadron to re-inforce the pursuit of Blue 1. Red 5 to advance. E. in half column of squadrons from the left to attack Blue 5. Red 4 (Fig. 5) to send a squadron against the left flank and rear of Blue 5.

Red 6 to pass on and complete the turning movement as before.

Here the Reds would have had 22 squadrons against the Blue 16.

The last example is the most important all. It illustrates the method, before alluded to, of making up by manœuvre for want of numbers when opposed to an enemy of superior strength.

To accomplish this requires good officers and good men.

Our British cavalry are good enough for any call that may be made on them. Our Native cavalry in India have so improved in the last twenty years, that now, if well led, they should be a match for any troops they are likely to be called upon to meet in the field. But will they be well led? (I am not talking of pluck, there is no fear of that, but of skilful handling.) That depends on how our cavalry officers prepare themselves now in time of peace.

We will now suppose a Red force of 24 squadrons and a battery opposed to a Blue division of as many guns, but 36 squadrons. The odds in numbers against the Reds, are 3 to 2.

How are these odds to be overcome? We must go back to first principles. The enemy must be beaten in detail. We must bring against certain points superior strength, defeat the points, and establish a vigorous pursuit, but, *with small units*, (Flying cavalry are most prone to stampede, and to over-estimate the pursuing force) while we rapidly rally our engaging squadrons and resume the offensive in another direction.

That this will tax the troops severely is most evident, and yet I believe it can be done, and what is more, I believe it *must* be done if we, with our smallest of cavalry armies, are to contend with any Great Power in the field.

Here, as in the last example, a surprise is required, else the enemy, if he foresees our aim, can easily defeat it.

Pl. VI. Fig. 12, shows the hostile Divisions approaching one another.

The Red commander has made a personal reconnoissance and is aware the enemy's strength.

He determines to attack their outer flank, *i.e.*, their second line, and simultaneously the flank of their first line. He orders his guns to come into action about 900 yards in front opposite the centre of the enemy's advance and deploys 5 regiments into line, keeping one concealed in rear.

Remarks.

The first object of this procedure is to induce the enemy to post his guns and thus declare which is his outward flank. From their position at (a) Fig. 12, the Red Division can equally well act on either flank.

The *modus operandi* is to feint a front attack, form an echelon on the move and then make a rapid flank movement, at the same time throwing back the refused flank so as to force the advancing line into making a change of front just at the moment of attack.

The general deployment is carried out at a walk (heads of regiments walking). Until the enemy has shown his hand, there should be no advance.

The position of the guns deserves notice.

These must be sent not to flank as under ordinary conditions, but straight to the front, aiming at the centre of the enemy's line.

It is needless to say that with inferior strength in cavalry, the artillery must surpass themselves in activity and hold their ground to the last.

The guns will form the *point d'appui* of their side, and it will be greatly owing to their demoralizing fire that success will be possible.

Fig. 12, shows the Red first formation at (a) with squadrons deployed about 2,000 yards from the Blues. The position of the latter, however is that which eventuates when the Reds have reached (b).

This show of 20 squadrons on one front is calculated to mislead the enemy into supposing he has a much larger force opposed to him there is really the case. He will credit them with supports and a reserve in rear.

Remarks.

Of course, under such conditions, the weaker side must take extra precautions to prevent the enemy's patrols reconnoitring and ascertaining the real state of the case.

As before said, surprise is the aid to success. It will be observed that the 6th regiment is kept carefully concealed.

On the Blue guns coming into action, the Red commander rides to the right of his line (he now knows which flank to strike at) and takes ground to the right front until he sees his flank is about opposite to that of the enemy's support, at the same time he advances his 1st brigade in echelon of regiments from the right at a trot, as shewn at (b) attaching one squadron from his reserve to each regiment 1st brigade, and 2 squadrons to the 1st regiment 2nd brigade. These are concealed in rear

Remarks.

Owing to the smallness of the scale, the Blue 1st line is drawn deployed. They would at this distance (1,600 yards) probably be in squadron columns. The Red side does not work in squadrons at all, deeming this a bad formation when under fire.

In Fig. 13, each side has advanced 400 yards. The Red line, on arriving within 300 yards of the guns, forms echelon of regiments from the right.

The enemy is now 100 yards off, and the moment has come for rapid manœuvre.

The regimental commanders have been warned before hand of their several rôles, so they take their cue from the leading regiment.

The first 3 regiments—"Troops, Half Right."—"Gallop."

The 4th regiment—"Troops, Half Right"—"Gallop"—"Form Column of Troops."

The 5th regiment—"Troops, Right Wheel."—"Gallop."

The Blues get the word to Gallop at the same time.

Nos. 1, 2, and 3, Red, resume their original direction when sufficiently on the flank, here 220 yards, and the Blues have advanced the same distance in Fig. 14. Here the Blue commander seeing the flank movement and that if he keeps on three-fourths of his line will charge the air, orders a change of front half left.

Nos. 1, 2, and 3, Red, reduce the pace to a trot and advance in half column of squadrons from the right of regiments, the auxilliary squadrons always keeping concealed in rear.

Nos. 4 and 5 continue their course at the gallop to throw back their left flank and get into echelon of regiments from the right.

Remarks.

The object of the Red general is to delay the fight on his left until his right is victorious. He gallops when making the out-flanking movement, and pulls up to a trot as soon as it is completed. This is sound. I believe it is a mistake in a cavalry action to gallop one yard more than is necessary. The horses will require all their wind and vigour in a moment, and when attacking cavalry it is not speed but good order and cohesion that is necessary. Galloping means opening out, and opening out means defeat.

Fig. 15 shows the first collision about 45 seconds later than Fig. 14.

The Red 1st brigade attacks the Blue 2nd line, while the concealed squadrons, galloping round, fall on both flanks and on the rear of the Blues.

Red 3, charges Blue 7. The two squadrons in rear gallop round by the right and fall on the Blue flank and rear, one of them engaging the succour squadron.

The Blue guns are silent, while the battery is enfilading the Blue echelon with ease at 350 yards.

Fig. 16 shows the possible, but very improbable position, some 40 seconds later. If the Red guns are well served the Blue regiments 4 and 5 should be routed by this, and it is very doubtful if their No. 6 would ever have stood the enfilade fire on its right flank and the rush of fugitives on its left.

Examples might be continued *ad infinitum*, but, except as outlines of possible action, they are of little use. They teach nothing. What our cavalry officers really want is the habit of quickly forming a plan of action to meet the exigencies of a developing situation: in other words the cultivation of tactical common sense. No habit is formed without constant exercise: manœuvring in this respect is like fencing. The guards and points are learnt in a few lessons, (this is the drill) but the quickness and mutual acting of hand and eye, the prompt parry, the lightning riposte;—these are only mastered by constant practice against a skilful adversary. This is manœuvre.

To render the practice of war manœuvre in time of peace of real value, we must have efficient umpires.

As in the games of *Kriegspiel*, so in camps of exercise, the umpire is almost as important a person as the General commanding. Unless he is capable of clearly pointing out what has been rightly done, and what is wrong, the manœuvres teach nothing. There is one point in connection with our cavalry camps, where there seems to be room for improvement.

On the "Halt" sounding, when the first lines are 50 yards or so apart, it frequently happens that all manœuvring ceases.

The second lines *sometimes* engage, but it is very rarely that we see any portion of the reserve enter into the fight.

It appears to me that when any unit of a force is manifestly worsted, either by superior numbers, or by attacks on its flanks or rear, that the umpire should order such unit to break up and retire at a gallop in such a direction, for so many minutes. The victorious side should then detail a unit in pursuit and rallying as quickly as possible, engage in another direction.

Only in some such way will our leaders learn the capabilities of their troops for opposing superior numbers, and this is what, when all is said, we mostly require.

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ERRATUM.

In line 8, page 497, of the November Journal
for "100 yards" *read* "800 yards."

Intelligence and Reconnaissance. *der Götter* On "Intelligence and Recon-
noitring" which are of the greatest
interest. They are as follow:—

"Intelligence of the enemy is, as Clausewitz says, the basis of all ideas and actions in war. To it, accordingly, belongs a prominent place. It is impossible to use any wiser judgment as to our own decision than to consider what will probably be the enemy's action. Therefore, it is by no means permissible to make oneself dependent upon the actions of the enemy. Only he, who sets about his task with a faint heart confines himself to the defence. The more vigorous resolves to make it its aim to force in spontaneous action the law upon the enemy, and to do it in the very place where the enemy feels it most acutely. In order to be able to do this, it is, before all else, necessary to ascertain his intentions. Good intelligence gives a vast superiority. As Frederic the Great said:—'If we, at any time, were to be aware beforehand of the intentions of the enemy, we should always, though with an inferior army, be superior to him.'"

"A good knowledge of the enemy, is, in these modern times, brought into the war ready to hand, as his war organization is carefully studied in times of peace. And this is the material part of the work of the General staff. A correct estimate of the enemy before the campaign, is the necessary basis of the whole Intelligence Department. As to the first gathering of the enemy's forces one will not, as has been seen, be in complete uncertainty."

"Moreover, during the time that the first transport of troops takes place, the enemy's land is not entirely closed; communications thence are possible. But after the commencement of operations, things assume a different shape and they speedily transpose and shroud in darkness the original picture. From that time on, it is necessary to find fresh light each day. Among the means which offer themselves to this end, those which the armies possess of their own energy are to be preferred to all others."

"As a matter of fact, the cavalry is the eye with which the army sees. The activity of this arm can best ascertain with clearness the measures and intentions of the enemy. Its celerity enables it, at the same time, to anticipate events. It discovers to-day, what awaits the army to-morrow, or even later. Its functions are to find the enemy's columns on the march, his camps and vedettes; and this done, to keep them constantly under its eye. It must surround the enemy like an elastic material, avoid him when he advances in force, but cling to him and follow him whither he retires. The intelligence that it brings, has the advantage of being immediate, and of attaching to what is of importance at the moment. It has this great advantage over spies, that all the intelligence comes from professional persons. To these duties belong much intelligence and appreciation of warfare; but the cavalry officer of the present day is trained for them."

Now, as to reconnaissance duties in general. Text books speak much and I am about to give you one or two examples "of well-mounted officers, accompanied by a handful of daring riders, breaking through the enemy's bullets, making their observations right in the front or in the rear of the enemy's main army. Such performances are at all times most creditable, but they are difficult, as the enemy will use his cavalry in the same way. They require an extraordinary amount of courage, extraordinary circumspection and extraordinarily good fortune. Therefore we must not build our calculations entirely upon them, much as all good cavalry will endeavour to distinguish itself therein. It is also of vital importance to have touch of the enemy at a considerable number of points. Scarcely ever will any one piece of intelligence give perfect information. The great dimensions to which we must now give our attention, prevent that. Yet reports from twenty or thirty different places give us the picture required."

In the campaign of 1870-71 a reconnaissance, such as the above Count Zeppelin's Officers' patrol, took place. A Württemberg Staff Officer, Count Zeppelin, accompanied by a small patrol of 4 Baden officers and 4 well mounted privates, succeeded in making his way through the French outposts near Lauterberg

on the 26th July 1870, (or at the very beginning of the war), and riding for 26 miles through a frontier district 20 English miles long, without interruption.

In the end they were surprised at a small inn, the Schirlen Hof, to the South of Wörth, and 10 English miles in the rear of the French outposts, whilst engaged in baiting their horses, by a strong body of French Chasseurs, who vanquished them after a stout resistance. Lieutenant Winsloe of the Baden Dragoons fell, as the first victim in

Results.

this war; Count Zeppelin managed to escape, and brought the important intelligence to the Head Quarters of the IIIrd Army, that no large body of French troops was to be found in the district between Lauterberg and Wörth. This Lieutenant Winsloe, by the way, was the son of an English gentleman residing at Mannheim, in the Grand Duchy of Baden. I well remember, when a school-boy at Wellington College, the news of this gallant affair arriving, and the pride we all felt, that one of the officers concerned in this brilliant reconnaissance was an Englishman.

To resume :—

“It is quite as hard to frame reports well, as it is to draw up orders. Perspicuity is the chief thing. It is impossible to lay down rules as to what must be reported, and how. In a great war it is, with few exceptions, only reports from officers that have to be considered. All the more must one, then, rely upon the judgment of the reporters.”

“Only certain incidents are of such an important character as to entail immediate intelligence on the part of the observer. When the enemy is for the first time seen, when infantry and artillery follow upon his cavalry, which has been hitherto alone perceived; when positions, which were believed to be occupied, are found to be unoccupied, important passages open, rivers of importance unguarded; when a noticeable change is observable in the enemy's line of march, and when moreover, cannonade announces a collision, intelligence is always sent back in order to rapidly acquaint the commanders of the columns following.”

“It is often quite as important for the commander-in-chief to know that his cavalry have nothing to report, that they cannot discover the enemy in any given direction, as it is that he has been met with in another. From this fact may be seen of what importance energetic reporting is, even when there is no special news to give.”

“In order to see much, the cavalry must spread itself considerably. If it is able to extend beyond the enemy's wings, it is a considerable advantage. With all the more certainty will it thus, at the same time, conceal the movements of its own army. But the veil, on the other hand, must not be too thin in order that the enemy cannot break through it. Bodies of horse must follow the patrols, in order to prevent this.”

“The enemy will think and act in the same way. The natural consequence is, that the cavalry divisions which precede the armies, speedily come into collision. Where the space between the armies in advance, and the nature of the ground, do not preclude it, the operations are ushered in by a series of cavalry skirmishes. Only the side that succeeds in

previously defeating the enemy's cavalry, can chronicle valuable successes in the Intelligence Department. Then only will individual officers and small detachments be able to penetrate to the enemy. As a matter of fact, it is only a superior force of cavalry that is of use, (superiority not being looked for exclusively in numbers, but in a correct proportion of efficiency and numbers), for the weaker will, without fail, be very soon driven back upon the column of the army corps following it up on the march, and it is here rather an impediment than a help. It can then neither conceal the movements of its army, nor yet discern those of the enemy. This circumstance must be taken into account in the question so often discussed as to how much cavalry we ought to have. The number of cavalry depends on the relations of reciprocity subsisting between those powers that may possibly be arrayed as enemies against each other."

"The successes of Intelligence duty, are very dependent upon the character of the commands issued. The command so often given, that the cavalry shall advance to discover the strength and position of the enemy, is perfectly useless; for this order only denotes the natural duty of the arm. If, as often happens, it is instructed to discover the intentions of the enemy, the commander, as a matter of fact, demands of it that it shall perform a task which is really incumbent upon *him*. In both cases, there is expressed a helplessness in the command, and this will entail uncertainty in the carrying out of the order. It is wisest to leave to the cavalry simply the questions which it is most desirable for the commander-in-chief at the moment to have answered, *viz.*, whether here or there enemy's camps can be discovered, whether here or there towns are occupied, whether the vanguard or the masses of the enemy's troops have reached a given line, whether on a given railway or road, troops are being transported, or are on the march, &c. Such commissions, which cannot be misunderstood, will bring in clear reports, and from these the commander-in-chief can draw his own picture of the strength and position of the enemy and guess his intentions."

"Of an importance not to be underestimated is the organisation of the military system of reporting, within one's own army. The case may occur, that the sum of all the information existing with the troops, is perfectly sufficient for giving a picture of the enemy, but that, all the same, the commander-in-chief lacks the necessary intelligence."

"To begin with, it is difficult for the inferior commanders who find themselves opposed to the enemy, to decide whether what they observe is of importance to the higher authorities. And then, the officer of lower rank has often a tremendous idea of the omniscience of the commander-in-chief; and erroneously believes that he must be already acquainted from other sources, with that which he can announce. Upon a person not directly entrusted with the duty of giving intelligence, a certain modesty, and the fear of being suspected of a false ambition, will have a deterrent effect. Besides, every one is sufficiently busied with himself and his own professional sphere. He turns the news which comes to him primarily to account for this latter, and

easily forgets to communicate it further. The hotter the crisis, the fewer the reports ; because the leaders lack the time to examine them. Cases are not rare in military history of a high commander eagerly awaiting news from his Generals, whilst they are in possession of the wished-for intelligence, and yet they do not forward it. It may be laid down as a rule, that each and every commander must himself provide the intelligence he needs. Hereby is not meant that each one shall on his own account send patrols and officers to keep touch of the enemy. No ; rather the information that others have procured must be thoroughly utilised. But the connection between all separate parts must be carefully organised and kept going. The commander-in-chief must continually send officers from his staff to the army corps, and these latter again, must have their organs in the advance-guard, the vedettes, and in the cavalry which has been sent forward."

"It is essential that these messengers themselves shall be in no way occupied with the duty of leading troops, and shall be able to give themselves up entirely to the task of reporting. It has already been mentioned that it is necessary to entrust an officer in head-quarters with arranging this branch, in order that the machine may not cease to work at the moment. when both commander-in-chief and chief of the general staff are engrossed by the doubts that so mightily beset them. As a rule success is not attained by the fortunate arrival of sundry very minute pieces of intelligence, but by the careful utilisation of many."

Staff Officers' duties with the reconnoitring cavalry.

Now, as to the work of these staff officers employed with the reconnoitring cavalry :—Captain von Widdern well

explains this ; he says :—

"If the Generals who are placed at the head of the troops and of armies, could see everywhere with their own eyes, they would know in a very certain manner the situation of the enemy, and their resolutions would likewise gain in certainty. But, more often, they are obliged to base their decisions on news and reports which the troops send them. So also, they have to employ their staff officers to elucidate the situation, in very difficult circumstances, and at points where they would wish to influence by their presence."

"These officers always accompany troops employed in reconnaissance. At the moment of meeting the enemy, they concentrate all their faculties in observing ; then they return to communicate what they have seen to their chiefs, or if they stay longer with the reconnoitring troops, they send back their impressions in writing, by mounted orderlies."

"Sometimes, reconnaissance is the direct cause of important resolutions : the concentration of troops, change in operations or in the fight ; and the head of the army must, in order to decide better, observe from his own stand-point what the enemy is doing. Thus, sending out staff officers on this duty is absolutely necessary. On the same principle too, these officers should be with the advanced guards, especially if these are pushed on in pursuit of the enemy. Their presence there becomes even necessary, when, after victorious fight, con-

tact with the adversary has been lost, as at Wörth, Spicheren and Orleans, and the road by which the enemy retired, is not known. Uncertain as to the direction in which they must look for the mass of the enemy's troops the victorious troops cannot pursue in force, vigorously. It is first necessary to know the probable route which the enemy will choose, in a net-work which is often very divergent. But the officer commanding will only get practical and reliable news as to what has become of the enemy if this news is collected and sent in by a staff officer well up in the general idea of the operations; this officer goes with the cavalry which gallops at the heels of the fugitives."

"German staff officers were often employed on similar duties,

Examples.

during the Franco-German war, and they did their work well. It was thus,

that the chief of the staff of the Xth army corps accompanied the 5th division of cavalry on its reconnaissance in force on Vionville. On the same day, on the right of the 5th cavalry division, the 6th advanced on to the high plateau of Vionville-Rezonville; there again, a divisional staff officer, marched with the most advanced reconnoitring squadrons. Similarly, on the 18th August, after the 2nd army corps had struck camp in the neighbourhood of Vionville-Rezonville-Mars la Tour, and was marching northwards in masses ready to fight, to look for the French, and to attack them wherever found, staff officers accompanied the leading squadrons of the army corps, showed them the way, and sent back word to the chiefs of what they had personally seen and verified, of the situation of the enemy. During the critical days before the battle of Sedan, head quarter staff officers, as well as those of the Crown-Prince, were similarly used with much effect. The commander-in-chief of the army had to see through the obscure situation of the enemy, and above all to discover the direction of his march. There, again, officers of the general staff were employed with the reconnoitring cavalry."

Now, you all know, there are many different kinds of reconnaissance. To-night, I will only take two kinds; those made by officers' patrols and those made by large bodies of cavalry.

Firstly.—The officers' patrols. These consist generally of one or

Officers' patrols.

two officers and a few men, all carefully selected, and mounted on the

very best horses. The main principle is, that when long distances have to be ridden, such as would ruin a considerable body of troops if they attempted to ride them in one day, and when the object in view can be obtained by observation, and a larger force could not hope to remain undiscovered, officers' patrols are sent.

Usual Mission for officers' patrols The usual missions for an officers' patrol, are:—

- (1) To ascertain the enemy's strength, position, or direction of march.
- (2) To convey a despatch, or establish connection with some portion of the force with which there is no direct communication.

- (3) To reconnoitre a road, a river, or pass.
- (4) To ascertain whether the enemy is present in certain localities.

Let us take an example.

"In 1866, in the campaign in Bohemia, after the first fights, the Austrian army, which was retreating, was concentrated at Königgrätz. Reconnaissance by Major von Unger. In the Prussian army, they had no certain information as to this movement; and on the 2nd July the advanced posts of the two armies were less than a mile from each other without either adversary knowing of it. At head quarters, at Jicin, neither the forward march of the greater part of Austrian army as far as Dubenitz, nor their night retreat in rear of this place, were known. It was, on the other hand, supposed that the principal force of the enemy, must have taken up a position behind the Elbe, the wings resting on the fortresses of Joseppstadt and Königgrätz, and the preparatory dispositions—to attack them in front, or to oblige them by manœuvring to retreat, crossing the Elbe, below Königgrätz—had been stopped."

"The general march to the right, on Pardubitz, had already been published in army orders, dated the 2nd July, but its execution was to depend on the result of the reconnaissances which bore on the ground and the situation of the enemy."

"*Firstly.*—Information was wanted, as to what resistance would be met with in a front attack on the Elbe, and in a flank attack on the Aupa.

Secondly.—It was essential to find out, if large bodies of the Austrians were still on this side of the river. If this were proved to be the case, it would be absolutely necessary to attack them immediately with all numerical superiority. The existence of an enemy's camp near Lipa, and the presence of other troops on this side of the Elbe, were speedily announced by a detachment from the advanced posts of the 2nd army."

"In order to get more precise information, instead of making a grand reconnaissance in force, only small patrols were sent out towards Königgrätz. With one of these patrols went a head quarter staff officer of the 1st army, the Major von Unger; it consisted only of an escort of Uhlans. The second patrol was under the direction of an officer belonging to the same staff, Lieutenant von Bulow; it was made up of 2 cavalry subalterns, and 20 men and horses."

"These patrols at the end of their reconnaissance were hotly pursued by the enemy, but, as they were well mounted they nevertheless managed to bring to head quarters, on the night of the 2nd July, news gathered, partly from prisoners whom they had captured. Their reports showed that the whole of the Austrian army was still on this side of the Elbe, concentrated behind the marshy bank of the Bistritz; the reports were so complete, that from then, the necessary dispositions for the converging attack of the 3 Prussian armies were made, which took place the next day."

"The appearance of these plucky little officers patrols in front, and even in the midst of the Austrian advanced posts, disarmed all suspicion of the Austrian staff, that the Prussian masses were so close to them; thus, the next morning the Austrians were completely surprised, by a general attack on the Bistritz."

Now, a reconnaissance in force would have alarmed the enemy, and at least would have made him more on the alert; and, at the same time it would probably have given the Prussians a much less accurate idea of the situation of the enemy; the results here of a reconnaissance in force, would probably have been more profitable to the Austrians than to the Prussians.

This reconnaissance I will now relate in detail; it was published in "*L' Histoire de la Guerre*" of 1866 by Fontanes, and was reproduced in the "*Revue Militaire de l' Etranger*," of October 1885, from which I now translate it

"Major von Unger, (who had received orders from Prince Frederick Charles to push on to the Bistritz), first went to General V. Fransecky at Horsitz, and thence to Gutwasser, to General von Horn. The information that he picked up on the way was almost the same as that in possession of the general staff; it became, then, more and more essential to penetrate well behind the enemy's advanced posts; General von Horn to effect this, ordered out a squadron of Thuringian Uhlans, as escort; but as the horses had not then fed, Major von Unger determined to start off at once, with a party of five Uhlans; the squadron following later on."

"The Major first of all followed the main road, along which had been posted small bodies of Uhlans of the 8th division, very much pushed forward towards the enemy; then went off to the right to get to the Bistritz by a lateral road or, at least, to get up to the heights of the Dub, from which the whole valley of the Bistritz could be seen. The reconnaissance arrived, without being disturbed, at a fold in the ground in the valley itself, down which ran a small stream; Major von Unger standing on this side of the little water-course, at once concluded that the outposts of the enemy's camp, which was probably situated just behind the heights on the other side, had been pushed forward as far as this ditch, parallel to the general lie of the Bistritz valley. He was aided in these conclusions, by the fact that at that very moment he saw the enemy relieving their pickets. What he had to do, then, was to get right in rear of this line. In order to do this, it was necessary first to descend a slope and go up another, to avoid on the way a village situated in a valley, and occupied by a party of the enemy."

"The Major took with him the small party of Uhlans along whose chain of vedettes he had just ridden, and so brought up the strength of his little party to 16 men and horses; he then rode off to the right, and in the direction of the village of Klenitz. Before even going down the first slope he saw an Austrian Uhlan patrol pass about 100 yards off, going in the other direction."

"The officers saluted as they went by, but one of the Thuringian Uhlans, who had not quite taken in this strange compliment, fired off

his pistol. Wonderful to relate it was not noticed elsewhere ; but the bullet hit its mark. The horse which had been hit in the flank by the bullet, came down with his rider, and the horse just behind also fell over his leading file. The whole of the enemy's patrol then broke up and fled, and the Uhlans who had fallen, were captured."

"Close to Klenitz the patrol came across some peasants. The information they gave agreed with that which had been extracted from the prisoners. According to them, at Sadowa was posted the 3rd corps; behind it, in the direction of Königgrätz, the 10th and 12th corps; the Saxons were at Probus. The 3rd corps had pushed forward one of its Brigades (that of Prohaska), as far as the heights of the Dub. If this information was correct (which could not be doubted) the troops immediately in front, were those of the 3rd corps. It was, in fact, the Prohaska Brigade."

"In the meantime the Uhlans had reached the bottom of the valley. The stream, which they had to cross was bordered on both sides by marshes and impracticable bogs; the horses sank in and it was very bad going. At last, a sort of stone causeway was found, by which they crossed the stream. Major von Unger, appreciating the importance of this crossing, left there a party of Uhlans, so as to mark the place, in case he was pursued. To this precautionary measure he owed his safety later on.

He then went on across some fields, and soon passed by some isolated sentries, thence to right up to the Dub, which was situated on this side of the heights, behind which were concealed quantities of Austrian chasseurs. Not a musket shot was heard. It was clear that the Prussian Uhlans had been taken for Saxons, just as had happened in the case of the peasants just before; they even saluted from a distance and, of course, the salute was returned."

"At last they reached the summits of the heights of the Dub, and beneath them lay the valley of the Bistritz. One look sufficed to convince them that they were in the presence of a large force of the Austrian army; I said, one look,—that indeed, was all they had time for, for at the moment that they reached the crest a Squadron of Austrian Uhlans, warned no doubt by the fugitives from the 1st patrol, debouched from Sadowa, and gave chase."

"The Prussian rôle was not to fight; and so they went about, and then began a mad ride across country, a true steeple-chase. The enemy's Uhlans, thanks to their fresh horses, at last caught up the others; they were Polish Lancers, and very quick with their lances, and they tried by making passes and repeated thrusts, to upset the Prussians, who parried and thrust as well as they could with their horses plunging from the effects of the lance thrusts of their adversaries.

"One of the pluckiest of the enemy, 12 lengths ahead of the others, attached himself to Major von Unger, and had wounded him with his lance, in the thigh, and would not be shaken off, so a non-commissioned officer shot him with his pistol."

"The chase over hedges and ditches went merrily on until, at last, the party posted at the causeway over the stream came in view, and a

minute afterwards the patrol crossed over ; they had made a new start, and luckily at that moment the squadron of the Thuringian Uhlans appeared on the heights in rear, from Gutwasser, collected the fugitives and stopped the pursuit."

Captain Max Jahn, in his account of the battle of Königgrätz, relates what followed and what were the steps taken, in consequence of the Great results.

information given by this patrol.

"Major von Unger, in returning to the head quarters of the Prince, met on the way, at Milowitz, General von Horn. The General wished to attack the position on the Dub at once ; but he was told, that probably, a general attack would be made the next day, by the 1st army. And, in fact, this actually occurred. At seven o'clock in the evening, Major von Unger arrived at the Prince's head quarters, at Kamenitz. The Prince had not the slightest doubt that the main body of the enemy was on this bank of the Elbe, between the river and Bistritz, and it appeared to him not improbable that this large concentration had been made with a view to an attack. Acting on this belief, the Commander-in-Chief of the 1st army, with the initiative of a true soldier, thoroughly realising his responsibility, resolved that he would attack the enemy the next day, instead of carrying out the reconnaissances which had been ordered for that day. At 9 p. m. orders to this effect were issued. We will not now go into detail, but will imagine ourselves at the Royal head quarters, where the Prince had to get the resolution that he had just taken ratified."

"Immediately after the departure of the messengers, the chief of the staff of the 1st army, Lieut.-General von Voigts-Rhetz, left for Gitchin to inform His Majesty, and so solicit his sanction to the orders which the Prince had just given.

He arrived at 11 o'clock at night, and was at once received, although the King, who was very tired after a hard day, was just preparing to take the rest which was then absolutely necessary.

The King followed on the map, the explanations of General von Voigts-Rhetz, and studied the probable positions of the adversary, as far as he was able to deduce them, from the reconnaissances which had been already made ; he then ordered the attendance of Generals von Moltke, von Roon, von Alvensleben and von Treskow. Some of these Generals had already turned in for the night, but they were not long in arriving, and then began the famous council of war, about which the King wrote the following words, in a letter to his wife, Augusta :—"I am advised to seize the favourable occasion, which seems to present itself, of attacking the enemy's army on this side of the Elbe, and of offering him battle. With this idea, the first army will form the centre in front of Sadowa, General Herwarth, with a corps and a half, will take the left at Nechanic, and Fritz with the 2nd army, resting with his left wing on the Elbe, will fall on the right flank of the adversary. Only at midnight had I arranged everything with General Moltke."

General von Moltke had together with General von Voigts-Rhetz been in favor of an immediate attack ; but as has already been said, the

opinion that only one or two corps of the Crown-Prince should be engaged, was held by the greater part of the members of this council of war. It was the King himself who realised that, if General Benedek was really holding on to this side of the Elbe, that the services of every available man should be utilised, so as to obtain the greatest results." What these results were is now a matter of history; the decision then given probably decided the fate of Prussia, and changed the face of Europe. The above account, then, shows us the importance of the results obtained, and at the same time it shows us the accidents which might befall an officer's reconnaissance, escorted only by a patrol, and the difficulties which might divert his attention from the main aim.

I will now give you another instance of a reconnaissance by an officers' party. I have translated it from General De Brack's well-known book, "Light Cavalry Out-posts."

"In 1814, General Maison ordered an officer of the Red Lancers of the Imperial guard to go to Lille at the head of 100 lancers, to reconnoitre the enemy at Menin, and to bring back thoroughly reliable information. This officer left at 2 P. M.; the sun was setting before the clock towers of Menin appeared in view; he had concealed the march of his detachment, and he now placed them in ambush at about $1\frac{1}{2}$ miles from the town. When night fell, a night of inky darkness, he approached the town with a squad, to within musket shot, then stealthily stealing through the outskirts of the town with an officer, a non-commissioned officer, and a trumpeter, he dismounted, had his horse held and hid himself in a ditch, by a bridge. The enemy's reconnoitring parties kept on entering the town, passing quite close to him. In spite of the darkness of the night he could make out clearly their figures against the sky, so that he was able to count each man and to distinguish the different uniforms."

"Furnished with this information, which gave a very good idea of the number and composition of the enemy, and when he was certain that all the reconnoitring parties had come in, and that he had nothing more to fear from them, he sent for a dozen of his lancers. A peasant, coming out of a house, and passing close by him, saw him, and was about to cry out, but a non-commissioned officer seized him, and putting a pistol to his breast, he conducted him to the rear. The lancers arrived silently, just at the very minute when the enemy's post was preparing to raise the swing-bridge; he charged with his men on their too confident party, took 18 mounted men prisoners, and immediately effected a rapid retreat. He gave accurate information to the General, and he brought back all his men, without having had one man even wounded."

Now let us take another example, also from de Brack, and for the accuracy of which he has vouched:—

Reconnaissance in Italy. "In 1809, General Curély, then a Captain, and A. D. C. to General Edouard Colbert, was charged with the duty of reconnoitring the march of the Austrian army, which was retreating to meet the army of Italy. He outstripped our division by 30

miles and, at the head of 100 horse, he got round the flank of the Austrian army, and crept so secretly in rear of them, that at the close of day he found himself hidden in a wood, two miles in rear of the village in which the head quarter staff of the Archduke were quartered. A great, sandy plain, separated the wood from the village. Two or three Hungarian marauders, whom he stopped, gave him some useful information. A large herd of oxen, coming in from the fields, and making for the village, passed close by his place of concealment; he seized the herdsman, and drove the herd into the wood until night-fall, then, sending them on again, he put his troopers, dismounted, in the middle of the herd, and made the men lead their horses; they then all moved on the village under cover of the dense cloud of dust which they raised.

The night, the dust, and the fatigue of the enemy, and the little annoyance the Austrians had experienced from the side from which the heard was approaching, served Curély's purpose so well that he penetrated right up to the market place of the village, where, with his own hand, he set a light to the house of one of the chief officers of the Commander-in-Chief, the Archduke. At the signal of the burning house, his troopers mounted, laid about them with their sabres, and profiting by the surprise and stupor of the enemy, they rode out of the village and next day rejoined Colbert's brigade without having lost a single man or horse. The position of the Austrian head quarter staff, which had been exactly reconnoitred, gave certain indications of the position of the Italian army, so that, two days afterwards, we came up with it and engaged its rear guard on several occasions."

The history of the war of 1870 teems with examples of reconnaissance by cavalry in force. In fact, up to the fall of Sedan, the German cavalry

may be said to have been engaged in one long reconnaissance. They enveloped the French armies, spied out every movement, cut off trains and supporting troops, threw themselves into any gap which presented itself in the encircling band of iron, which was being formed by the German infantry and guns, and they prevented the French Cavalry from seeing anything of the movements of the German armies, by preventing any attempt at reconnaissance on their part.

In the Journal of the United States Cavalry, for June 1891, the author of an article on "The proper employment of Cavalry" gives several graphic accounts of the daring and enterprise of the Prussian horse at this time, which he takes from French sources.

Colonel Bonie, says:—"Arrived at Sarrebourg, the regiments were reformed. We received in the middle of the day of the 8th August, orders to saddle and mount, because the enemy's cavalry was in view; some scouts were mistaken for the head of numerous columns. From that moment until we reached Luneville, their scouts watched us unceasingly. Linked to their army by horsemen, they gave an exact account of our positions, of our halts, of our movements; and, as they watched us from some little distance, incessantly appearing and disappearing, they spread uneasiness."

This was the cavalry that destroyed the railway junction at Nancy, and prevented the 6th French corps from receiving its reserve artillery, ammunition, and engineers. This corps, a few days later, defended St. Privat, on the French right, at the battle of Gravelotte, and much of their disaster at that place is attributable to the fact that this corps was tactically incomplete.

Another officer writes :—" We saw on a hill, one or two thousand yards off on our left, three small groups, one mounted, the others in advance dismounted ; on the slopes of the little valley that divided us, we saw a single horseman, entirely exposed, alone in the fields near a hamlet, the inhabitants of which stared at him in surprise. We could not deceive ourselves, it was the enemy. One of the dismounted parties mounted and disappeared, followed by the others. The single horseman, after carefully watching us, vanished also."

These contact scouts, from the advanced cavalry reconnoiters, had passed twenty-four French squadrons, two divisions of infantry, the reserve artillery and baggage, and were dogging the flanks of the leading infantry division of that retreating army.

General Vinoy says, of his retreat from Mezières :—" From that moment we became the object of continual and rapid inspection from the enemy's scouts. They kept galloping on our flank, just out of range, seeking to see the head of our column and to calculate its strength, and report to their supports."

Since I began compiling this lecture I have seen an article on

Remarks from the Strategic and Tactical Role of Cavalry by Captain Aubier, 12th Chasseurs, translated by Captain Nixon,

and published in the Journal of the United Service Institution of India, for June 1893. In this most able article, the writer holds that in war there will be for cavalry "Two distinct phases of exploration, separated by a phase of fighting. Two objectives are projected on our horizon ; the first the hostile cavalry, the second the point of concentration of the armies ; and, on the road between the two, the inevitable battle."

The Cavalry acting in advance of the armies must explore the country, fight and drive back the enemy's cavalry, and get close to the masses in rear. The writer states, and it is now an axiom, that the collision of these cavalry masses must occur, and that only after it is over will the victorious cavalry be able to penetrate to the masses of the enemy.

"Cavalry to the front" now being the accepted maxim of the German generals, Captain Aubier states "This imposes on the French similar action, in order not to incur inferiority at the commencement, and not to abandon to the Germans the privilege of reconnoitring, and as a consequence, the initiative."

"Whatever be the ground, these masses of cavalry, collected on the flanks of armies in contact with each other, are called on then to rush on one another. Then, being clear of the grasp of the enemy, and free from the restraint of guarding against him, and having acquired full liberty of movement, the victorious cavalry will at last be launched

to accomplish the second part of its task : the discovery of the hostile masses."

Captain Aubier states that the method of performing the first phase of reconnaissance should be to concentrate. "From this concentration will spring strength, and, consequently, the spirit of the offensive, the initiative of the attack." What is wanted then, are "some light and clear-sighted elements in order to see, and a mass, coherent and powerful, for the fight." "In every case—and in all occasions of war—concentration of force is an immutable principle which can never be violated with impunity." Now, he asks, what will be the rôle and composition and procedure of the elements which are detached to see? "Now a fallacy, the issue of the experience of great manœuvres, has spread abroad this idea, that very effective results can be obtained by means of small groups composed of a non commissioned officer, and two or three men. In fact we have seen such groups display an unparalleled audacity, and traverse or turn all the hostile lines, and ever sleep in the enemy's camp. But we forget that, besides every consideration of material danger, the morale of these men is not at stake. Now the morale is everything in war, 'and I do not believe that reconnaissance would be carried out in the same manner in the midst of a hostile population and of hostile troops. Moreover, the Regulations formally order that the division commander should determine the force of the troop or the number of men who should accompany the officer.' According as the country is friendly or hostile, according as the ground is free from the enemy's cavalry or covered by his squadrons, the reconnaissance will be composed of several men, or of a whole troop."

In this special service, more than in any other, ought conventionalism to be avoided. Circumstances will decide dispositions which are essentially variable; in some cases, 100 picked men may have to be sent; in others, one officer, or two officers, by themselves."

"In all that concerns patrols we cannot be too strongly convinced that, to see, to gain contact, they will have first to push back the opposing patrols, to have a certain force of penetration and, consequently, that they must be of equal strength, if not superior, to those of the enemy." 'The Germans' said General de Kerhué. 'The Germans say that, to see and observe, small patrols will not last long, that they will vanish at the first resistance, that they will be able, at the most, to say, where the enemy is not; so force will soon have to be substituted for cunning; that is to say, that the fight will soon occur.'

"Let us make no mistake, about it. With the ideas of the offensive which the German cavalry profess, with the force of traditions with which it is animated, the duties of reconnaissance, I mean the reconnaissance *at the commencement*, will be carried out at the point of the sword; and the best manner of meeting this process of intimidation is to make our discovery parties very strong, and to instil into them, as orders, that they are to charge headlong all groups inferior in number who try to oppose their march. In order to ensure the execution of this, it will be necessary to give the groups of discovery the double superiority of quality and quantity; that is to say, a *large* strength, and for leaders, *officers*."

"The strategic reconnaissance ought not to affect the form of a beat after hares, but that of a vigorous and uninterrupted offensive ; in fact, a sort of general offensive."

"Finally, the condensed troop, that is to say the troop stripped of its indifferent men and horses, and provided with all the modern machinery for the transmission of intelligence, seems the best type of a scouting party. It is not, however, necessary to multiply the number of these groups ; for a mass of troops—an important tactical unit—cannot live and sleep in the open ; cannot wander about haphazard in the country, without direction or object ; but it leaves one position to take up another ; in a given zone, it is a question of determining these positions and these directions, of probing the latter, and seizing the former, and neglecting the remainder."

"To sum up ; the duties of reconnaissance require picked groups, all commanded by officers."

The above remarks refer, of course, to the reconnaissance of the independent cavalry, acting in advance of the main armies, against the enemy's cavalry.

With reference to the 2nd phase of exploration, namely that in which the reconnoitring cavalry has to get touch of the main body of the enemy, and to report on his positions, movements, points of concentration, &c., I think that in modern war, against a civilized enemy, it would be advisable to use infantry in conjunction with the cavalry and horse artillery.

In an article on "cavalry reconnaissance" published in an Italian magazine, and translated by Captain A. Montanaro, 16th Bengal Infantry, and republished in the Journal of the United Service Institution of India, in December 1891, this constant co-operation of infantry with the reconnoitring cavalry is very strongly put. The writer recommends that a battalion of very carefully picked infantry, say of Bersaglieri, per cavalry division be told off for this duty. The infantry to be carried in carts as far as possible. The carts to be of regulation pattern, four wheelers, and drawn by four good horses. Every cart should carry 14 men, so 64 carts roughly would suffice for a battalion 900 strong. Entrenching tools should also be carried in the carts."

In India, carts would be very useful for rapidly transporting infantry along good roads ; but on the north-west frontier I would prefer to see the infantry mounted on thirteen hand bazaar ponies, simply for rapid locomotion. I would also like to see a camel corps company (each camel carrying two infantrymen) attached to every regiment of cavalry, British and native, in the 1st army corps.

In reconnaissance these animals are invaluable ; from their backs one has a great range of view ; the camels can travel great distances, they eat the food always easily obtainable in Afghanistan and Persia, and they require little grooming or care. In action they generally keep quiet, and with one foot shackled, will not attempt to move.

In conclusion, I think our cavalry wants practice in training men and officers, in reconnoitring bodies of troops from great distances, and in re-

Conclusion.

porting what they see. A good practice, I think, would be to send patrols out to watch a field day, or even ordinary drill, from a point conveniently situated, say two or three miles off. They should report at what time exactly the troops appeared in view, in what formation, the number and composition of the troops present, whether Europeans or natives, or both; what was done, &c., &c.

On the return of these patrols, their reports might be verified by notes, taken by a specially appointed officer with the troops manœuvring or drilling, giving full detail of what actually occurred.

REMARKS ON LECTURE.

Major H. M. MASON, Commanding 4th Lancers, Hyderabad Contingent:—

General Stewart, General Protheroe, Major Lawford and Gentlemen:—

I propose only to speak of officers' patrols, which by moving boldly and rapidly to the front, obtain the first news of the enemy.

If officers' patrols are carefully selected and well trained, excellent results may be expected of them.

I am of opinion that officers' patrols should be as small as possible consistent with the fact, that there must be sufficient men to enable the information gained to be submitted to the staff.

The smaller, however, these patrols are, the better, for they will the more likely be able to probe deeply into the enemy's screen unobserved.

I will now say a few words concerning the training of these patrols.

In 1878 shortly after I joined the Hyderabad Contingent, General Wright, who was then Commanding, directed that each cavalry regiment in the force should select a body of commissioned officers, non-commissioned officers and men who should be especially trained in reconnaissance duties.

This was done and was found to work well and was only allowed to fall into disuse, owing to the paucity of British officers to carry on the training, sometimes there not being more than two or three with a regiment.

Every cavalry regiment should at all times have a body of selected officers, non-commissioned officers and men who excel in the performance of cavalry field duties and who are ready for any emergency.

One officer, three non-commissioned officers and ten men per squadron should be selected, bearing in mind that such men should possess intelligence, enterprise, dash, energy and decision of character, keensighted, and be above all good riders.

They should be mounted on the best horses in the regiment, bearing in mind, that such horses should possess strength, power of endurance, speed, activity and staying power, they should be free from vice, good feeders and sound; bays, browns and chestnuts only being selected.

These horses should be trained as much, gentlemen, as you would train your race horses, for much is expected of them. They will have plenty of work and should always be fit to go.

As regards the men, training should be carried out in doors by means of lectures, which would include the preparation of rough sketches, and the method of making reports both written and oral.

Practical instruction should be carried out mounted and dismounted, estimating the strength and composition of bodies of troops (as suggested by Major Lawford); this could be carried out very often as troops are always somewhere or other for training. Reconnaissances should also be performed for information of ground. To carry out these general officers commanding might call upon the officers' patrols to report on selected parts of the country, noting on their instructions the length of time granted to obtain the required information. Such information would be very useful in selecting ground for camps of exercise.

Indeed there are many other ways of which valuable instruction could be given, *shikar* being amongst the number, for I have invariably found men who are good *shikaries* make excellent reconnoitrers. Accustomed as they are to roam about the country picking up information here and there; and they also learn the way of making friends with the inhabitants and being surrounded as they would be with people of unknown character, learn to sleep with one eye open, which is a good habit for a reconnoitrer.

Now, gentlemen, I can well understand there are many young officers present here to-night, who will not thank me for suggesting more work for them when they already have so much to do. To these I would say, remember, this band of reconnoitrers is the *corps d'élite* of the regiment and only the smartest officers and men should be selected for it; those who possess the very soldier-like qualifications I have enumerated, alone being eligible for selection.

The names of every officer, non-commissioned officer and man selected, should appear in regimental orders and some distinguishing badge should be worn by the men.

A return should be submitted monthly to the general officer commanding showing the work done during the month.

All officers and men in the *corps d'élite* should be excused as far as possible from regimental and station duties. Promotions should be made for those who distinguish themselves; and those who prove themselves unfit, should be at once turned out.

Of course, I do not propose in any way to lessen the training of the regiment in reconnaissance duties; but it is certain that from the *corps d'élite* many efficient instructors could be obtained and thus the instruction they have received would be gradually extended to the regiment.

I would ask commanding officers to consider the sense of security they would feel knowing they had at their disposal, four highly trained officers' patrols, on whom they could place perfect reliance for procuring information.

Should these suggestions be accepted the chart and compass competitions ordered by the Inspector General of cavalry, could be carried out by the patrols thus trained.

General M. PROTHEROE, C. B., C. S. I., Commanding Hyderabad Contingent :—An important point in Major Lawford's lecture is, I think, in regard to the transmission of useful intelligence from the reconnoitring squadrons.

The cavalry obtain this intelligence by great exertions and in order that the fullest use and advantage may be obtained from it, it is essential that the information so obtained should be compiled, and sent or taken back by some officer who knows the plan of campaign and can therefore estimate more or less correctly the value of the information acquired. It is therefore the practice to depute staff officers to accompany reconnaissances who will send or take back information to their generals. Major Lawford has given us several illustrations in his lecture where the plan has worked well in foreign armies and I hope I may be allowed to add two instances where it was successfully practised in our own service. During the Afghan war in the march from Kabul to Kandahar, it was necessary to ascertain whether Sirdar Ayub Khan who had invested the latter place, was covering the approaches to Kandahar from Kabul, or whether he had taken up a position elsewhere. As the British cavalry screen approached Kandahar, Colonel F. Chapman, R. A., Assistant Adjutant General of the force, (now General Chapman, C. B., Director of Intelligence, War Office) accompanied the reconnoitring squadrons until it was ascertained beyond doubt that Ayub had retired to a position beyond Kandahar, when he returned to the G. O. C. with this information.

Subsequently, when a reconnaissance of all arms was made of Ayub's position beyond Kandahar, Colonel Chapman accompanied the reconnoitring force, saw for himself or obtained information on the spot regarding all points useful to know, and returned at once to his chief with such details as enabled him to promptly make the most suitable dispositions for the attack, which was delivered the following morning.

Captain H. L. PILKINGTON, 21st Hussars :—The subject of Major Lawford's most interesting lecture always seems to me the most important and absorbing subject which cavalry officers can discuss. I am firmly convinced that reconnaissance is the most important of all the duties of cavalry in modern warfare, and also that it is the most difficult of those duties to perform efficiently. This opinion is, I regret to say, not shared by all cavalry officers. We often hear reconnaissance and outposts named together in a manner which shows they are regarded as subjects of about equal importance, demanding about equal shares of our thoughts, our time and our work. My own feeling as to their relative claims is this :—I think I could teach any squadron all that it is in me to teach them about outpost duty in a week at the outside, but that weeks and months must be spent before I could make any body of men into good reconnoitrers, and that at the end of months and even years of instruction individual men and the units they belong to would

still be capable of almost infinite improvement in reconnaissance. In the scheme of ideal cavalry training which hangs before my imagination, training in reconnaissance occupies quite half the plan.

I had the honour to deliver a lecture in this room about thirteen months ago on the training of cavalry for reconnaissance. I then expressed the same opinion as to the importance of the subject under discussion that I have expressed now. Major Lawford on that occasion took me to task for what I had said, and quoted triumphantly from the proceedings of a French commission on cavalry as follows:—"Cavalry having gained touch of the enemy, operates in advance of the army; it draws a curtain to cover the movements of the latter, and engages the enemy's cavalry by means of successive shocks, gradually increasing in intensity, until the skirmishes of reconnaissance become charges in mass." Captain Lawford used this quotation to support his view that cavalry reconnaissances are only preliminaries to fights in mass, and that therefore reconnaissance stands second in importance to mass tactics. Now to me it seems that this view—that the reconnaissance by cavalry on a large scale must end in a cavalry fight—is the most dangerous view that cavalry leaders can possibly allow themselves to indulge in. Perhaps Major Lawford has modified his opinions since last year; but I think I discern in his lecture the same tendency. He has at any rate again produced quotations which, like that I have read, support his expressed opinion as to the conclusion of the great reconnaissances. He has quoted Von der Goltz, who, after discussing the conduct of the reconnaissance, says:—"The enemy will think and act in the same way. The natural consequence is that the cavalry divisions which precede the armies, speedily come into collision. * * * * only the side that succeeds in previously defeating the enemy's cavalry, can chronicle valuable successes in the Intelligence Department." Again he has quoted Captain Aubier and in reference to him says:—"The cavalry acting in advance of the armies must explore the country, fight and drive back the enemy's cavalry, and get close to the masses in rear. The writer states, and it is now an axiom, that the collision of these cavalry masses must occur, and that only after it is over will the victorious cavalry be able to penetrate to the masses of the enemy." But I must remind Major Lawford that quotations do not prove everything, and I am glad to be able to produce against him an extract which represents very sound opinion on the opposite side. In Vol. III. of the new Cavalry Drill, sec. 52, para. 12, where the advanced cavalry force is being treated of, I find, after an admission that fighting may be necessary, these words:—"The division, however, should never fight if it can avoid it, that is, unless the enemy's screen cannot otherwise be pierced, or it is necessary to establish a moral superiority." I cannot help feeling that the glory and *éclat* of a great cavalry fight must be a dangerous temptation to the cavalry commander, and I believe it is a temptation that he cannot too carefully school himself to resist.

Let me say that this feeling arises from no want of confidence in the fighting powers of the arm I have the honour to belong to. I dare say there is no cavalry officer in this room more convinced than I am

that such triumphs over infantry as that of Mars-la-Tour can be repeated, and none probably with greater faith in my arm as a weapon against artillery in action. But I see no reason why the squadrons of hostile armies should wreck each other under circumstances which make decisive results almost impossible, and where nothing short of decisive results can lead to any good.

When I have urged the necessity for higher training in reconnaissance, I have before now been met by the question "How are we to find the time?" I must ask you to forgive me if, in seeking to answer this question, I digress a little from the matter in hand.

It is, I think generally held that the army at large (cavalry included) has just gone through a period of revival, and it is true that, since a period which even I can remember, a great change in the way we work has taken place. In spite of this I believe that the cavalry either is or ought to be considered only on the threshold of revival. I believe that science has placed possibilities within our reach which we have not yet grasped, and that this age of progress has still much progress in store for us. But if we are to add to our acquirements we must save time. To save time I want to see an entirely new drill book. We have only just got one, but I believe we already want another to replace it—a simple one, based on what I believe to be the sound principle that cavalry should fight in single rank—a drill book which would enable us to save all the time now devoted to such things as formations to the outer flank and our complicated column-of-route formations, which, I believe, adds no more to our fighting efficiency than it would if it were spent in solving Chinese puzzles or in practising the three-card trick. Let me remind you that Lord Wolseley has advocated single rank, and I am not aware that he has ever withdrawn from that opinion. Some time might also perhaps be saved from our musketry training and much from the evolutions of the riding school.

Having already inflicted on many of you, my ideas on cavalry training in reconnaissance, I will not go over much old ground. But when I lectured here last year Vol. III. of the cavalry drill had not appeared. I then said:—I will take advantage of the absence for the moment, of authoritative instructions regarding the subject of my paper, to put forward ideas which may not prove to be in accordance with those instructions when they appear. I do so, however, for purposes of discussion only, believing, as I do, that it is not only necessary from a disciplinary point of view, but of paramount importance to efficiency, that in the actual training of our men we should be at all times within the four corners of the "red book." Vol. III. with its instructions for reconnaissance, is now published, and very excellent those instructions are, though to my mind they seem, I confess, not yet full enough, and though there is still more allusion to "Reconnoitring Formation" and less elasticity when intervals and distances are mentioned than I could wish. Let me repeat what I said here last year on this subject:—"I cannot refrain from saying here a few words about what are sometimes called *reconnoitring formations*." This term is usually applied to an attempt to do what I believe to be impossible—namely, to enable

one commander to conduct a reconnaissance on a broad front, without deputing independent command to his subordinates. He is usually expected to arrange his subordinates, with their small detachments, in a row, and, from a central position in rear, to control them as if by leading strings. The attempt, as far as I can judge, always fails; and, even supposing it to succeed so far as the maintenance of the commander's control is concerned, it is plain that the advance of the whole reconnoitring line must be checked by anything which checks a single part of it—that the delays encountered by a single “reconnoitring group,” will be multiplied by the number of such groups in that line. It may be added that the country to which such a system can be applied at all is extremely rare. It appears to me that no party under one man, can reconnoitre on a broader front than is covered by the vision of its flanking parties, and that the object of such a party, being to push forward and find the enemy as quickly as possible, its advance should never be hampered by considerations of what its neighbours on the right and left may be about. The first maxim of the *cordon* system of outposts—that all the country watched by the line must be under observation—has some general application to reconnaissance, but the second, that each post must always be seen by those on its right and left, has no such application whatever: and the idea of a reconnaissance conducted by a regular line of observing parties, like a sort of marching outpost line, appears to be based on an entire misconception of what reconnaissance means.” I have seen no reason to change my opinion since I wrote that.

When speaking of the performance of intelligence duties by the staff during reconnaissances made by large bodies of cavalry, Major Lawford again quotes Von der Goltz to show that these duties should be performed by officers of the General Staff—that is of the staff of the Commander-in-Chief, and not by a specially organised intelligence department forming part of the division or brigade. He has quoted the case of the reconnaissance on Vionville made by the 5th German cavalry division, which was accompanied by the chief of the staff of the Xth corps. I venture to think that this use of the General Staff in this and similar instances should be regarded as mere makeshift. I do not know what the German regulations on the subject now are, but in our own army orders of 1st August 1891,—which contain, I think, the latest instructions on the subject,—I find that a Field Intelligence Department, consisting of a D. A. A. G., a staff captain, a clerk, mounted police, servants and an interpreter, forms a part of a British cavalry division. It seems to me that the independent brigade might with advantage have an intelligence officer attached to it also. I cannot but think that it is a sound principle that the officers charged with sifting the information collected by reconnoitring cavalry should be permanently under the control of the commander of that force. Of course, as I think General Protheroe said, close touch must be kept between the division or brigade and the General Staff, but the point of contact should not, I think, be within the legitimate province of the cavalry commander.

Here, at Secunderabad, all cavalry subjects possess a peculiar interest, for we have the great and rare advantage of having three cavalry regiments always at the station. This interest in cavalry subjects will be intensified when the two Imperial Service regiments now being raised under an able commander by the government of His Highness the Nizam, are ready to take the field, for Secunderabad will then be able to boast of a unique position among the military stations throughout the British Empire in being able to place a cavalry division of five regiments on parade on any day in the year.

General R. C. STEWART, C. B., A. D. C., Commanding Secunderabad District :—Major Lawford in his interesting lecture has given us several valuable examples of cavalry in reconnaissance from Continental authors, and one of the conclusions he arrives at is the advantages of picked groups commanded by officers for these duties. In the importance which he attaches to this I entirely agree, but perhaps I may be allowed to make a few remarks on the application of this theory to service in India. Any one who has had experience of commanding cavalry at large camps of exercise which of late years have been held in India, will probably have experienced, as I myself have, the difficulties of providing officers of native cavalry for officers' patrols. The present organization of native cavalry does not admit of surplus officers for detached duties. The result is that a commander has to draw all his officers' reconnoitring parties from the British cavalry. This not only tends to throw unnecessarily hard work on the British cavalry but it detaches a greater number of officers from the corps than the commanding officer cares to spare. The lighter equipped and more active native soldiers would be better fitted for reconnaissance, and the system has the disadvantage of not giving to the officer of native cavalry that experience of these most important duties which is desirable under the existing system and organization of native cavalry. I do not see how this can be avoided. The only course to be pursued seems to me to be to give the native officer a higher education and so render him more fitted for duties which require special observation and intelligence.

With regard to what Major Lawford said on the advantages of infantry with reconnoitring parties, though I can conceive the possibility of a select corps of infantry being sent forward with the cavalry and horse artillery on such an occasion as when a commander has determined to seize and hold a forward position, I think that the fire of dismounted cavalry is not to be despised and it must always be remembered that reconnoitring parties, however large, must be prepared to retreat in the face of superior demonstration on the part of the enemy; and that infantry, unable to fall back with the cavalry would be a source of embarrassment to the commander and might suffer annihilation.

I am entirely in accord with the lecturer in the importance he attaches to the training of officers and men in duties connected with reconnoitring.

I think if this special part of a cavalry officer's duties were more earnestly studied, and imparted to the rank and file we should not witness the ridiculous scenes which occasionally happen with the cavalry

at camps of exercise, and I still further think that part of a cavalry officers' training should be the powers of endurance of the horse.

Young officers are frequently ambitious, and at peace manœuvres are anxious to dash forward for the purpose of gaining information oblivious of the fact that in an enemy's country they would have to exercise the greatest caution and forgetting that part of their duties is to explore the country, and to give their commanders information as to its character and the best routes for an advance.

I can quite conceive it possible if ever in India there is a movement of large bodies of cavalry such as was contemplated in 1885, that unless the General husband his cavalry, and puts a check on the zeal of officers at starting a large proportion of his cavalry force would be *hors de combat*, from indiscreet use of horses in reconnoitring duties, before a month had passed.

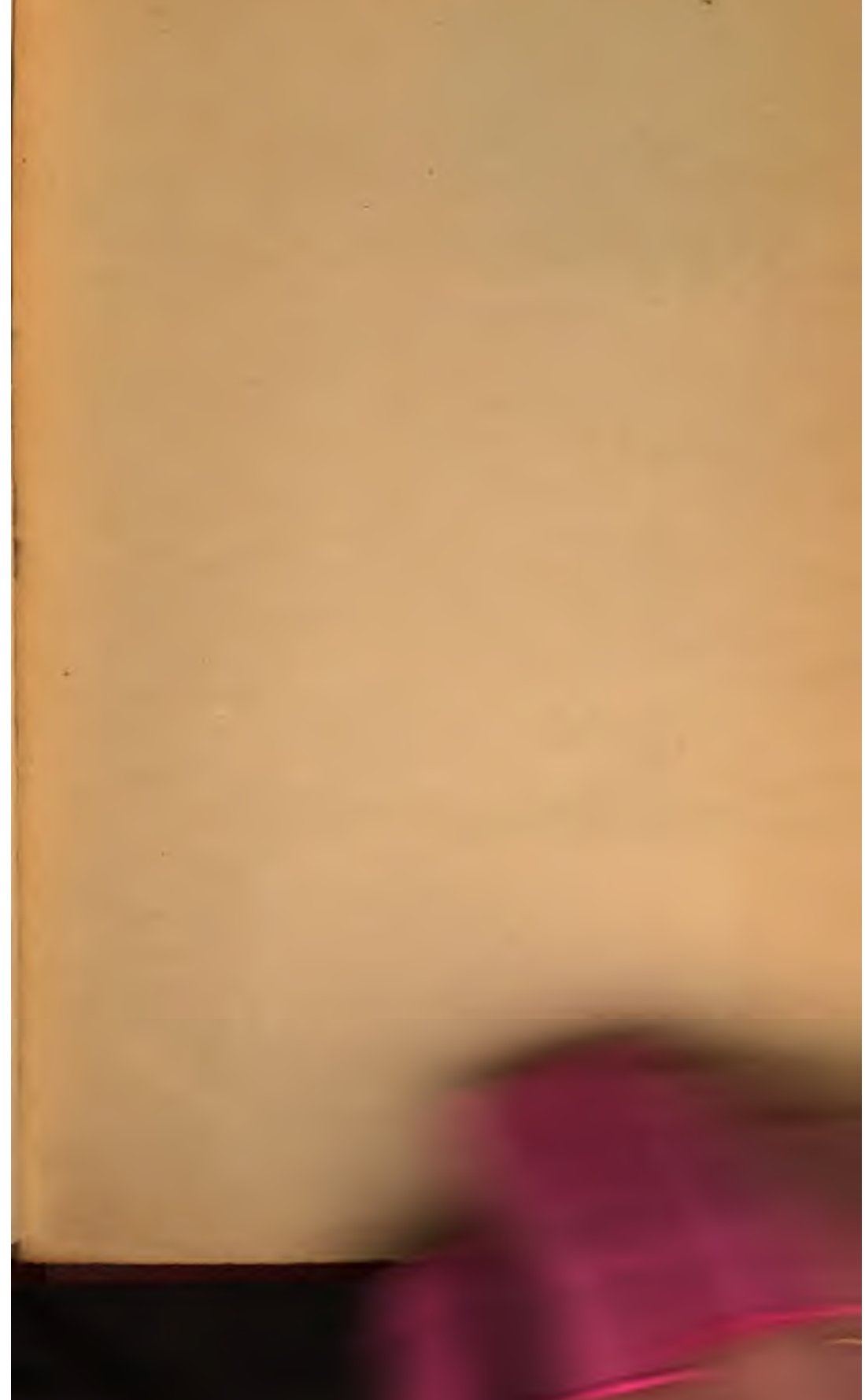
In considering the possibility of such an event, I am inclined to think it would be preferable for a commander to select from his cavalry force a certain number of squadrons composed of men more specially adapted to these duties than the rest of his force, and to entrust reconnaissance duties to these troops only, reserving his heavily armed troops for fighting tactics.

Believing as I do that native cavalry should be able to perform all reconnoitring duties and considering that with the nature of the country and the climate, they are adapted to these duties which carry with them much exposure and hardship, I have always much regretted to see the late tendency that exists to increasing the number of Lancer regiments in the native army, but this leads me outside the limits of the present discussion, and will I hope serve as a future theme for lectures by cavalry officers.

Major Lawford has touched on the advantages of detailing staff officers with reconnoitring squadrons, and General Protheroe has given us an interesting illustration of a reconnaissance of this nature on the march to Kandahar. Captain Pilkington, however, does not conceive the presence of staff officers necessary, deeming that all their duties could be as well performed by the officers belonging to the reconnoitring unit. I am inclined to think that there are advantages in the presence of staff officers with the reconnoitring parties which can best be appreciated by the general officer himself. There may be certain points on which the General would wish special information which he would intrust with greater advantage to one of his own staff rather than to an officer of the unit whose attention would be taken up with his own duties and the command of his party.

I am quite sure you will all thank Major Lawford for the interesting lecture he has given us.





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